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DELIVERING ON NUCLEAR DETERRENCE: A CONVERSATION WITH PRINCIPAL DEPUTY
ADMINISTRATOR OF THE NNSA FRANK ROSE

WEDNESDAY, MARCH 13, 2024

MODERATOR: MICHAEL O'HANLON

Senior Fellow and Director, Strobe Talbott Center for Security, Strategy, and Technology, Brookings

FRANK ROSE

Principal Deputy Administrator, National Nuclear Security Administration

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O'Hanlon: Good morning, everyone, and welcome to Brookings. I'm Mike O'Hanlon with the Foreign Policy Program, and we're just thrilled to welcome back our good friend Frank Rose, who had been a scholar here for a number of years. Frank is the principal deputy administrator of the National Nuclear Security Administration. Put more simply, he's the number two official in charge of our nuclear weapons. And he's been thinking hard about that issue for much of his career. A lot of his career has focused on what you might broadly call strategic issues. He's worked a lot on space. He's worked a lot on arms control, verification and compliance. In fact, he was the assistant secretary of state for arms control, verification and compliance in the Obama administration. Here at Brookings he was a great, great teammate for all of us and taught so much about strategic issues and convened a number of important fora, wrote a lot of important work, and we know he will continue in that vein. Just a quick personal note before I welcome him to the podium, and then we'll proceed with his remarks, followed by a conversation up here and then some questions from you. But I want to just tip my cap to Frank and thank him as an inspiration for his broad knowledge of strategy, but also history. He's just one of the most intellectual and thoughtful strategists and scholars I've ever met, and I've met a lot being here at Brookings now for 30 years. And we were just exchanging memories and thoughts of the southern campaign in the Revolutionary War, which is something that he taught me about and helped me get motivated to write the new preface for my most recent book on military history. And he still knows the details of the southern campaign better than I do, even though I just finished a book chapter on the subject. So he's just also one of the greatest guys and a wonderful colleague. So could you please join me in welcoming back to Brookings Frank Rose.

Rose: Mike, thanks for that very kind introduction. It is fantastic to be back at Brookings. You know, it's kind of funny. The best advice I received when I first got to Brookings was from our colleague Bob Einhorn. He said, Frank, I'm going to give you a piece of advice. And that piece of advice is do not try to compete with Mike O'Hanlon. He is an absolute freak of nature. I've never seen anybody put out more books when you are 15 or 16 now? I mean, it's amazing. I mean, when I was in college, I had his first book, Defense Planning, in the late 1990s. So I had him I had a copy of that. I had him sign it when I came here. You know, it kind of reminds me of a quote from former Senator Fritz Hollings from South Carolina. I think some of you of a certain age probably remember Fritz. I almost worked for Fritz in the late 90s when I moved back from London. And he he used to talk like this. Nobody. He ran for the Democratic nomination in 1984. And they said the reason he came in so far behind in New Hampshire and nobody in New Hampshire could understand what he was saying in that South Carolina draw. But he once said, hey, that guy, he, he, he graduated magna cum laude. I graduated, thank the Lord. And when I look at when I look at Mike, I was like,

oh, wow. I'm just glad, you know, he's writing a book. I'm just glad to get off a blog. So, it is a real pleasure to be back at Brookings, to be amongst so many old colleagues and friends, and to be able to speak with you this morning. I'd like to broadly focus my remarks on three topics. First, what is the National Nuclear Security Administration and what do we do? Two how we are adapting to a rapidly changing security environment and delivering an effective nuclear deterrent? And three, I'll conclude with some thoughts about what we can do in the near term to prepare for future arms control. Now, I'd like to begin, however, by quickly surveying the emerging threat conditions that are shaping our decisions about nuclear deterrence, nonproliferation, and arms control. On Monday of this week, the Office of the Director of National Intelligence released its annual threat assessment and concluded up front that, quote, The United States faces an increasingly fragile global order, strained by accelerating strategic competition among major powers, more intense and unpredictable, and transnational challenges in multiple regional conflicts with far reaching implications. Specifically, the DNI warns that, quote, the expansion of nuclear weapons stockpiles and their delivery systems, coupled with increasing regional conflicts involving nuclear weapons states, pose a significant challenge. End quote. Of these competitors Russia maintains the largest and most capable nuclear weapons stockpile and even prior to its invasion of Ukraine, was working to expand its and modernize its nuclear weapons capabilities. Moscow continues to develop long range, nuclear capable missiles and underwater delivery systems meant to penetrate or bypass missile defenses. Russia is also expanding its large, diverse, and modern set of non-strategic systems capable of delivering nuclear warheads. These capabilities are particularly ominous given President Putin's dangerous and irresponsible statements, and those of other Russian officials, hinting at the potential use of nuclear weapons in Ukraine. Russia's unprovoked invasion of Ukraine has also featured an unprecedented event in a history of warfare, ongoing hostilities around and armed seizure of an operating civil nuclear power plant. The risks associated with military activities around and against Ukraine's nuclear facilities cannot be overstated. These activities undercut nuclear safety, hinder the International Atomic Energy's ability to fulfill its safeguards and security mandate, and increase the risk of a nuclear emergency that could affect large numbers of people in Ukraine and neighboring states, with impacts felt around the world. Russia's military attacks against, against and seizures of nuclear facilities in Ukraine severely undermine Moscow's claim to be and long-standing effort to promote itself as a responsible nuclear power, and have been strongly condemned by the international community. At the same time, China is in the midst of the largest ever nuclear force expansion and arsenal diversification in its history. According to the Department of Defense's annual report on Chinese military power, quote, the PRC is investing in and expanding the number of its land, sea and air based nuclear delivery platforms and constructing the infrastructure necessary to support this major expansion of its nuclear forces. End quote. This includes

developing and building a fast, fast breeder reactors and reprocessing facilities that would enable the swift expansion of its war warhead manufacturing capability. Consequently, if it continues the current pace of its nuclear expansion by 2035, China will likely field a stockpile of about 1500 warheads, together with hundreds of new ICBM silos constructed in the past three years, China appears to be abandoning its historic minimum deterrence posture. Moreover, despite repeated attempts by several U.S. presidential administrations, Beijing has shown no interest in engaging in either the strategic stability or arms control discussions expected of a responsible nuclear power. This opacity makes determining an effective strategy more difficult, both in terms of maintaining deterrence and in finding a way to integrate China in a future arms control and strategic stability framework. And note I actually wrote an article when I was at Brookings called "Integrating China into a Future Strategic Framework." So I recommend that to you. Long looking beyond these near peer competitors, North Korea continues to enhance its ability to threaten both our Asian allies and the U.S. homeland, expanding its nuclear weapons stockpile and a range of delivery capabilities and resuming ICBM testing. Indeed, in 2022, North Korea conducted 92 missile tests. Additionally, in stark contrast to the tenets of the Nonproliferation Treaty, last year, Kim Jong Un announced a quote new nuclear forces policy law that would permit North Korea to use nuclear weapons first against non-nuclear states. And in the past five years, Iran has expanded its nuclear program to operate more advanced centrifuges and enrich more uranium, including at levels closer to weapons grade. Consequently, the IAEA warned in December that Iran has enough material to make three nuclear bombs if it decides to cross the 60% enrichment threshold. And of course, Iranian proxies remain an active, an active threat to our national security and to international stability, having attacked U.S. forces in Iraq, Jordan, and attacking international shipping in the Red Sea. Taken together, these developments make for very for a very complex international security environment, one that is dramatically different from the one we faced 25 years ago. The U.S. nuclear deterrent is critical to deterring, and, if necessary, responding to these threats, which is why in NNSA Administrator Jill Hruby has frequently observed, quote, not since the Manhattan Project has there been a more challenging moment for the NNSA. Now, let me say a little bit about NNSA, who we are and what we do. It's kind of funny. When the president nominated me for this job, I called my father and I said, dad, the president has nominated me to be the deputy administrator in NNSA. And he said, Frank, you're going to be working outer space? I go, dad, not NASA. Then he says, oh, you're going to be working for the intelligence community. I said, no NNSA. Why don't you go look it up on the internet? So to his credit, he's 80 years old. He googled it, called me back, and he said, Frank, this is a really cool organization. And I agree. And, you know, although I see some friends and colleagues out in the audience who are familiar within NNSA and its predecessor agencies, for those of you who are not, Congress established NNSA in 2000 to consolidate all the nuclear security work at the

Department of Energy, and we have three key missions: ensuring the safety, security and effectiveness of the U.S. nuclear weapons stockpile, reducing the threat of nuclear proliferation and nuclear terrorism around the world, and providing the Navy with effective nuclear propulsion for our submarines and aircraft carriers. Everything that we do at NNSA, from stockpile stewardship to detecting signatures of clandestine weapons programs, is underpinned by the nuclear security enterprise's unique expertise in science and technology. NNSA manages eight government owned, contractor operated national labs, plants and sites throughout the country. These partners and the roughly 60,000 scientists, engineers, technicians, managers and support staff who comprise the nuclear security enterprise's workforce apply world class scientific, engineering and technological capabilities to support nuclear security and global stability. These partnerships are critical, and no partner is more vital to NNSA's success than the U.S. Department of Defense. After all, it is the Pentagon who designs, develops, and deploys the delivery systems that enable U.S. Strategic Command to execute its nuclear deterrence mission. In other words, DOD is effectively the, quote, customer for whom NNSA maintains maintains the stockpile of nuclear warheads, making sure it meets military requirements such as quantity of weapons and yield. NNSA has a responsibility to design the nation's nuclear stockpile and to maintain the stockpile without resuming nuclear explosive testing. These complementary efforts are closely coordinated through the Nuclear Weapons Council, which keeps warhead and delivery platform programs aligned and provides management, oversight and integration of all U.S. nuclear weapons programs. And NNSA is delivering capabilities to our partners, providing nuclear warheads that meet safety, security and performance requirements. NNSA is currently executing five warhead modernization programs. We are in close coordination with DOD on the 87-1 program, which will be fielded on the U.S. Air Force's Sentinel missile system that will replace the W78 warhead, the W80-4 life extension program will enhance the warhead safety, security and reliability, and, together with the Air Force's long range standoff missile, will support the long term effectiveness of the bomber leg of the nation's nuclear triad. The B61-12 gravity bomb life extension program is well into the production phase. The W88 alt 370 program has been executing and is deployed on the U.S. Navy's Trident II D5 submarine launch ballistic missile system and the W93 program, our first new warhead in almost 30 years, is synchronized with our allies in the United Kingdom, which is modernizing its nuclear forces as well. The W93 is being designed for a new -- for the new Mark 7 reentry body being developed for the Navy and is on track for production starting in the mid-2030s. Crucially, we are also adapting to the rapidly evolving global threat environment. Both U.S. Strategic Command and the U.S. Strategic Posture Commission agree that we must be ready to deter two near peer nuclear powers within a decade, and with the latter warning that the current program of record is adequate, but we will need to do more. Consequently, in October, the U.S. government announced the addition of the

B61-13 to the program of record. This weapon will replace some of the B61-7 weapons in the stockpile and have safety, security, and accuracy of the B61-12, providing the president with additional options against harder and - certain harder and large area military targets. These warhead modernization programs enhance the margin against failure, increase safety, improve security, replace limited life components, address component obsolescence, and support DOD's delivery platform modernization programs. We are pursuing a qualitative and comprehensive approach towards maintaining a viable deterrent for the future at a time of rising threats. This modernization strategy is not solely aimed towards meeting near-term threats the United States may encounter over the next 3 to 5 years, but rather attempts to look forward decades to hedge against risk and prudently plan for future contingencies. Moreover, NNSA is modernizing our stockpile both on schedule and at pace. This past year alone, NNSA delivered more than 200 modernized weapons to the Department of Defense, the largest number of weapons we have delivered since the 1980s. And the Los Alamos National Laboratory expects to produce the first diamond stamped, or war reserve plutonium pit for the W87 warhead program by the second half of this year. This is not to say we don't face challenges as we execute these missions and deliver the program of record. More than 60% of NNSA's infrastructure is beyond its life expectancy, with some of the most important facilities dating back to the Manhattan Project. Although we appreciate the funding Congress has provided for the purpose of rebuilding our national nuclear infrastructure, the COVID pandemic, acute supply chain disruptions, labor shortages and inflation have exasperated long-standing mission issues that make large scale construction projects difficult. Respected economist Austan Goolsbee and Chad Severson have published findings, concluding that the aggregate data shows a decade-long decline in U.S. construction productivity. And in the book "How Big Things Get Done," Brant Flyvbjerg and Dan Gardner present evidence that large nuclear projects are historically the most overscheduled and budget of all complex construction activities. These are baked-in challenges we are working to overcome in modernizing NNSA's infrastructure. However, we are making significant progress on the large-scale construction projects that will serve as the backbone of the nuclear securities enterprise's modernization. For example, the uranium process facility at the Y-12 site in Oak Ridge, Tennessee is now over 70% complete. Glove boxes are installed in the main process building. Overall, equipment deliveries are 96% complete and half and the last half of 20, and in the last half of 2023, over 58 miles of electrical conduit and cable was installed. We are also making steady progress at the Los Alamos Pit production project, also known as LAP 4, removing old contaminated materials and installing new and modern equipment, including its first new glovebox this year, and at the Savannah River pit production facility, we continue with the design and simultaneous construction start baseline, and costs schedule updates, and long lead procurement. We have reconciled safety basis issues and put in place an NNSA first-of-its-kind

construction management contract. Our goal at the Savannah River production facility is aggressive to complete construction by 2032, so that rate production can support the W93 schedule. Moreover, to sustain this progress and address construction challenges, we have begun working with the Army Corps of Engineers, who basically built the United States on best practices, especially in cost estimating and in introducing more disciplined metrics. While the U.S. nuclear deterrent is critical to responding and deterring threats, it alone is not sufficient to effectively respond to all the challenges in the nuclear security domain. For the United States, and our allies and partners not only require a strong deterrent capability, but also an equally strong commitment to nuclear nonproliferation and arms control, and to counter global nuclear threats. Ultimately, in my view, deterrence and NNSA's nonproliferation and arms control missions are what Harry Truman said. "Two halves of the same walnut." NNSA has a special responsibility not only for sustaining and strengthening our nation's nuclear deterrent and its extension to partners and allies, but also working to reduce global threats to international peace and security and contributing to international security. Although any major arms control agreements with Russia and China are likely unattainable in the near future, I believe that arms control does have a future, but one that will involve new actors, emerging technology and new experts. Consequently, we need to start preparing now to be ready to seize opportunities for progress when they eventually present themselves. This is why NNSA has established a new arms control advancement initiative to invest in the next generation of arms control capabilities. This initiative increases NNSA's investment across the innovation and technology development process now and for years to come, by focusing on four key areas: expanding, monitoring and verification research and development; establishing a dedicated user facility at NNSA's Pantex plant for testing and demonstration of monitoring and verification technologies on warheads and high fidelity surrogates; increased international collaboration and a new Next Generation Arms Control Experts program to develop a cadre of technical and policy experts to support future treaty development and implementation. In other words, while we recognize that although we may not be talking to Russia and China anytime soon, through the Arms Control Advancement Initiative, we are thinking through strategies and developing the science that can underpin future arms control efforts. In the end, we must be mindful of setting the conditions today for a balanced approach to our nuclear deterrent for decades to come. This means maintaining a safe, secure and effective and reliable nuclear stockpile and preparing the concepts and technologies for the next generation of arms control. To do this, we need new blood in the strategic deterrence and arms control community who can pursue these solutions with fresh thinking and renewed vigor. But it is necessary, and this is necessary in order to maintain an effective deterrent and global stability. I'll stop here, but I will say one of my fondest memories was hanging out in the Brookings cafeteria, talking to my colleagues about many issues of the day

-- and I was so delighted to hear that the Brookings cafeteria will reopen next month, and I'm going to have to come here for lunch with Mike. I remember what a special place Brookings is. When I came here shortly after I was hired, and I was standing in the sandwich line with Mike, and we were talking, and all of a sudden I saw this woman in front of me, and I said, "hey, Mike, that really looks like Janet Yellen." And he's like, "Frank, that is Janet Yellen. She is a new fellow here." But it's just fantastic to be back. This is such an important institution, that has, made so many contributions to the security of the United States and our allies. And, I am so delighted to be back. And I look forward to your questions. So with that, Mike, over to you. Should I be afraid or not? Welcome to the hot seat.

O'Hanlon: Frank, that was great. Thank you. Fantastic remarks. A lot of information. I found myself listening very attentively. You were reminding me and or refreshing me or teaching me things I really had not known nearly as clearly. So that was a really good set of remarks. Let me pick up with some of the facts and figures and priorities of NNSA. First of all, this is, of course, budget month. Yeah. And the NNSA budget is substantial. It's a substantial fraction of the overall national defense budget. It's not the Department of Defense budget, but it is part of the national defense budget. It's something in the range of \$40 billion, if I recall. Correct?

Rose: No, it's about 24.

O' Hanlon: Okay. 24. Yeah. But, if the overall difference between, yeah, the DOD and the national defense is about 45 billion and you're the largest share of that.

Rose: Right.

O' Hanlon: But of the 24, could you break it down for us? Just, you explained a little bit about some of your activities. But could you do it in budgetary terms?

Rose Yeah. So, our budget request -- I went up to the Hill on Friday, excuse me, on Monday -- is about \$24 or \$25 billion. I should have had the direct the exact figure, but about 19 billion goes to the weapons program. At the end of the day, our core mission is to design, build, and maintain the nuclear deterrent, but all the science and infrastructure that underpins the nuclear deterrent. It's kind of interesting, we took a Finnish delegation led by the Finnish ambassador to the United States out to the three national laboratories

last week. And at the end of the week, I said, what's your key takeaway from this visit? They said, well, there was a lot of information. But the the key takeaway they told me was they were impressed how the science was underpinned everything we do. So about 19 billion goes to the weapons program and associated infrastructure. About 2.5 billion goes to, global threat reduction. And there's two parts of that. We have the Office of Defense Nuclear Non-proliferation proliferation, which does all of the traditional non-pro nuclear security missions. And then we have the Office of Counter Terrorism and Counter Proliferation, which works around the world to be able to respond to nuclear or radiological threats. And then we have about \$2 billion that goes to the Naval Reactors Program. Now, Naval Reactors is unique because it is a joint program managed by NNSA and the Department of the Navy. It is, led by a four-star admiral, Admiral Houston. NNSA provides about half the budget for naval reactors. The US Navy provides the other. And that's just critical, to ensuring that we maintain the naval reactors on the aircraft carriers and the submarines, which, I would argue our submarines are one of the key asymmetric advantages that the United States has.

O'Hanlon: Excellent. Where is the cleanup money? Is that in DOE but separate from NNSA?

Rose The money for cleanup is in DOE. But there is a separate office called the Office of Environmental Management led by Ike White. Now, that said, we work very, very closely with, we call EM. Ike is the former chief of staff of NNSA, and he and I, and others have done a lot of joint work together. For example, we are managing the transition of the Savannah River site from EM to NNSA. Furthermore, the work that they do managing the the, the whip project in New Mexico is critical. That's where we store a lot of our spent fuel and waste.

O'Hanlon And by the way, not to make this into a game of Trivial Pursuit or jeopardy, but just make sure I'm not. It's the. You mentioned eight facilities. Sandia, Los Alamos, Livermore.

Rose: Yeah.

O'Hanlon: Idaho. Right?

Rose: No, Idaho. So let me give you the quick rundown. You know, the nuclear security enterprise consists of eight sites. At the top of the pyramid are the three national labs. Los Alamos. If you've seen Oppenheimer, the oldest, and Livermore, which was created in the early 50s to serve as a kind of, a peer of, Los Alamos,

those are our physics labs. And every nuclear weapon in the US arsenal was designed at either Livermore or Los Alamos.

O'Hanlon: 7 or 8 of them type, right? 7 or 8 different types.

Rose: Oh, more than that.

O'Hanlon: But I mean, yeah, I mean, now.

Rose: Yeah, yeah yeah, yeah. But but I'm just talking the history. And then we have Sandia. Sandia is the systems engineering lab. They design all of the non-nuclear components. And they are responsible for integrating the payloads with the DOD delivery systems. But I say their weapons labs, there are a lot more than weapons labs. They are really national security labs. Because I would argue, if you look at any of the emerging technologies hypersonics, cyber space, biological sciences, then artificial intelligence, the US national labs are at the forefront of the research. And the next line in the pyramid or next part of the pyramid are the three plants the Y-12 plant and Oak Ridge, Tennessee. That's where we build all of our uranium components for the secondaries of thermonuclear weapons. We also, work on special materials like lithium there. There's a Kansas City plant where all the non-nuclear components for our weapons are built. And then we have the Pantex plant in Texas. That's where all the weapons are assembled and disassembled. Pantex has this great sign on the front building that says all roads lead to Pantex. And then finally, we have the Savannah River site in South Carolina. That's where we currently extract tritium. Tritium is a gas used to expand the yield of a thermonuclear weapon. And as I mentioned, in my remarks, we are building a pit production facility. A plutonium pit, for those of you who don't know what it is it is a trigger or primary of a thermonuclear weapon. And then finally, there is the Nevada National Security Site, formerly known as the test site. That's where we tested the vast majority of the U.S. nuclear weapons. We no longer do explosive testing, but we conduct experiments there under our stockpile stewardship program to ensure we can maintain a safe, secure, and effective nuclear deterrent without a return to testing. We also do some work for our global security programs there as well. So that's the nuclear security enterprise. We have about 60,000 people, in the enterprise. About 2000 are federal civil servants, about 500 are members of the Office of Secure Transportation. These are the folks who move the weapons around. Most of them are former special forces. My favorite people to hang around with. They let me fire sniper rifles and grenade launchers. They're really cool. And then we have about 55,000 management and operating contractors. These are the

scientists, engineers and others who run the program on a day-to-day basis. As I mentioned in my remarks, we are a government owned, contractor operated organization.

O'Hanlon: And that's all to take care of about 4000 total nuclear weapons right, between strategic, tactical and reserve in today's inventory. So on that point, there are a lot of things that I really want to talk about. The W93 fascinates me because apparently we're designing this new nuclear warhead with no intention of ever actually testing it, which tells us a lot about the confidence we have from the science-based stewardship. So when you mentioned the Nevada site, are we assuming in our planning for future facilities that we will never test again? And relatedly, when you build all these pit production capabilities, you know, modernizing at Los Alamos and creating a new one at Savannah River. Are you assuming that we might have to increase the size of the U.S. arsenal? So is there any possibility of future testing being accounted for? That's question one. Is there any possibility of stockpile expansion being accounted for? That's question two.

Rose: Yeah. I mean, Mike, two really good questions. Let me start with the testing issue. When we started the science-based stockpile stewardship program in the 1990s, honestly, we didn't know if it was going to work. Indeed, when we were talking to a number of people at the labs last week during our visit, they said, you know, we ourselves started our careers and we were a bit skeptical. But fast forward 25 years. If you ask any of the lab directors whether they think we need to test, I think the answer will be a resounding no. And they would also argue, because of the science-based stockpile stewardship and management program, we know more about nuclear weapons than we ever did at the height of testing. Don't take my word for it. Take the word of the lab directors. Now, that said, we have a process every year in which the lab directors have to write a letter to the Secretary of Energy saying that we can maintain a safe, secure, effective, and reliable deterrent without testing. And there's a whole process involved with that. It's not just the lab director writing a pen. We we're taking weapons out of the stockpile. Doing surveillance, having red teams. And this culminates into a briefing with the secretary of energy, the commander of Stratcom, as well as the three lab directors. And they walk the secretary through. And I've sat and sat through several of these meetings, where the challenges are. But for the past 27, 28 years, they have said very clearly we can maintain the deterrent without testing. And the president ultimately certifies that to Congress. With the W93, as I mentioned in my speech, this is the first nuclear warhead we have designed in 30 years, and it will be the first nuclear warhead that we have designed without testing. And but what I would say is, I think the labs are so confident in the work that has been done and our knowledge of how the weapons work that we believe that we can design, build and maintain this new weapon without a return to testing. However, to do that, that

requires us to maintain the investments in science. I mean, one of the big things that I'm concerned about, and I know my boss, Jill Hruby, is concerned about, is there's a focus right now production, production, production. And I agree that we have to, improve our production infrastructure. It was ignored for a very long time. But if we focus solely on production and don't put the money into our science facilities, like the National Ignition Facility, which achieved ignition, about a year and a half ago, we could be in for real problems 20 years from now if we don't have the science to back up these programs. One final note, on testing, you know, under U.S. law, we are required to maintain the readiness to test should the president direct us to. However, NNSA is of the opinion that given the investments we've made in stockpile stewardship, we do not need to return to testing. Now, your second question about the expansion of the nuclear arsenal. As many of you are aware, the U.S. Strategic Posture Commission said we may need more and or different types of weapons to respond to the evolving security challenge, especially that two peer challenge. And what I would say at this point is the administration has not made a decision on, you know, whether we need more. But we are examining it very, very closely. The Nuclear Posture Commission says, the Nuclear Posture Review, excuse me, says we will make changes to the program of record as required. And the B61-13 decision shows you that as the threat evolves, we are prepared to make changes. Congress, in the FY24 energy and water appropriations bill, provided us about \$50 million, to begin two phase one studies to to look at what type of new capabilities we will need in this new security environment. So we're thinking about it. No big decisions to announce today. However, let me just say one point on NNSA, I do not criticize my predecessors for getting the future geopolitical environment wrong. We just didn't know. I think the mistake that we made as a nation with regards to our nuclear infrastructure is that we stopped making certain things like plutonium pits. And one thing I've learned from this job is once you start stop making a capability, it is hard to reconstitute that capability. So going forward and as we rebuild our infrastructure, I think we need to do it in a way, and this is what we're trying to do, where you can scale up and scale down as the threat environment evolves, but at the same time, you keep the core capabilities and the people, and that's what we're trying to do with the Arms Control Advancement Initiative. I mean, the, prospects for arms control right now, in the near future are pretty bleak. But we want to make sure that we maintain, with a steady stream of funding, the research and development money flowing into the program, but also, more importantly, keeping the people.

O'Hanlon: That was fantastic. I just have one final question. It's a little bit of a geeky techno question, but I think you can handle it. And, you know, even though neither one of us is a PhD physicist. But I'm curious about the W93 and as you say, the pit and the so-called physics package, the pit plus the lithium, the trigger,

the part that gets the whole thing going, which has usually been seen as the most sensitive part of a nuclear weapon. Is that a new design? Is the physics package itself new, or is this the weapon that you decided to have a lower yield by making the the secondary difference? So you're still going to keep essentially the physics package as it is. And then related to that, as you start to create these facilities to make new plutonium pits. Are you going to make them the same way as before? Because I know at Rocky Flats they were machined and that created a lot of waste. And now the goal is to make them more, I think, out of a molten metal. But that concerns some physicists that if the pit is fashioned in a different way, it may perform slightly differently. So any concerns on that front?

Rose: Well, what I would say, Mike, is, you know, if you look at the evolution of the U.S. nuclear stockpile since the end of the Cold War and our NNSA modernization program, at the beginning of the process, what we were focused on, for example, with the W76-1 is relatively minor changes to the non-nuclear components: reusing old pits, but keeping the physics package generally the same. Same thing goes for the W 88, which is being delivered to the Navy as we speak, and the B61-12. But -- and the same thing will happen with the W80-4. However, the W 87-1, that's essentially 95% new parts, including new pits. Okay. The W93 will be a new weapon. Again, I want to emphasize that we have confidence through our stockpile stewardship program that we can we can build that in an effective way without a resumption of nuclear testing. So that it is a new warhead. I want to just make it very clear. I also want to note with the W93, it is not a joint program with the United Kingdom. A lot of people think the W93 warhead and the UK warhead new warhead is the same one. It's not. Now they will have their own, we that we have to design our own separate physics packages. But a lot of the other non-nuclear components will be similar. So we, we call them separate but parallel programs. On the, the specifics of the pit that's classified. So I can't get in there. I don't want to go to jail. Right. I like you, Mike, but I'm not going to be your cellmate in, in federal pen. But what I would say is that we are working on pits in a way to ensure, effectiveness. And, you know, another thing we're trying to do is bring in new technologies. And, I mean, as we rebuild our infrastructure, we don't want to rebuild it exactly as we did, you know, 80 years ago. We want to bring in new technologies to improve safety, security and effectiveness.

O'Hanlon: Okay. So one follow up and then please have your questions ready. But I just want to stay on this for a minute and not get either one of us into jail. But I haven't, studied, you know, this stuff the way you have and don't have the access you do. But I do recall from previous work at the unclassified level on the stockpile stewardship program that one of the things you can try to do, for example, to understand how a different kind

of plutonium pit might behave is you could make a sort of a faux plutonium pit, out of different material, and you could make it the same way you're going to make the new pits with a molten process. And then with very high precision photography and other and X-ray techniques, you can watch how it collapses as you simulate what would happen in the beginning of a nuclear explosion. And you can do that with materials that are not threatening, not dangerous, not nuclear, and make sure that the dynamics of that collapse process are very similar to what would have pertained or happened before, and then do your computations to make sure that's adequate to then ignite the secondary. Is that a fair summary of what goes on?

Rose: Yeah. Listen, we've got a lot of money invested to make sure that we can maintain a safe, secure and effective deterrent, without a resort to testing. And really, we are focused at Nevada National test facility on ensuring that we understand the dynamics of pit aging.

O'Hanlon; Yep. Good. Thank you. So already, please, I will start with Amy. And please wait for a microphone, identify yourself and look forward to your questions.

Audience Question: Hi, Amy Nelson Brookings. Frank, very lovely to see you. And thank you so much for sharing your knowledge and expertise today. Much like the Brookings cafeteria, I'll give you a little buffet, but I'll do it quickly. I am wondering if you could speak to the critical nature of of transparency at test sites, the ongoing diplomatic efforts, the enduring nature of the SLCM-N debate, and why it might be more prominent right now despite the lack of SPC recommendations about that specific capability. And perhaps contrasting efforts, or a kind of a contrasting movement in the Pentagon to zero out expenditures related to arms control inspections and maintaining the expertise there. Is your program designed to counter that? Would it be better to work in concert?

Rose: Well, Amy, let me start with the arms control piece. I was not aware of the decision, so I can't really comment on that. But what I would say is what we have a great partnership with the Defense Threat Reduction Agency, which is responsible for arms control implementation at the Pentagon. Indeed, I'm going to spend all afternoon with Rebecca Hersman over in her conference room with her team, talking about how we can work together in a more effective way on arms control technologies and my understanding, reading in my read-ahead for that meeting is actually there, the DTRA has, a lot, going on in this area, and we're actually going to get together and talk about how we can work more effectively together. I would say DTRA or Defense Threat Reduction Agency is probably one of our most important partners. On the SLCM-N

debate, I won't say much other than, as you know, the Nuclear Posture Review stated that given the fact that we had the B61-12 gravity bomb, we had the LRSO, long range standoff weapon, coming online in the early 2030s, and we currently have the 76-2 the low-yield variant of the Trident D5 missile, we did not need SLCM-N. Reasonable people can agree to disagree sometimes. Congress has made it very clear in the FY24 national defense authorization that they, they, that the Department of Defense and NNSA need to create this as a program of record. And we are currently consulting with DOD as well as Congress on the way ahead on that. With regards to the issue of test site transparency, I'm very glad you brought that up. I want to make clear the United States has no plans, despite what Russia says, to resume nuclear testing. My boss, Jill Hruby, gave a really good speech at the Comprehensive Test Ban Organization's R&D conference this past June, talking about exactly what types of tests that we do at the Nevada National Security site. I believe in December, we invited about 25 NGO participants to come out and see what we're doing. A lot of that information is on the internet. And I believe, several NGOs have discussed in blogs and other reports what's going on there. You know, we want to be transparent. We have nothing to hide with regards to our activities. We've always said the focus of our activities at the national security site in Nevada is to ensure that we can maintain our deterrent without a return to explosive testing. We do non-nuclear experiments. We have been very transparent. We have invited ambassadors from the IAEA to come visit. We hope they will take us up on that invitation sometime in the near future. But we also call on Russia and China to be as transparent as we are.

O'Hanlon: Fantastic. It's pretty good. Even just to remember three questions, much less to answer. Also.

Rose: I'm smarter than I look. Mike.

O'Hanlon: Yeah. Any other thoughts? Questions from the audience. We got about five more minutes. And, did I see a hand? Yes. Right here.

Audience Question: How does open.

O'Hanlon: Please identify yourself.

Audience Question: Hi. I'm Susan, I'm a college student from New Jersey. And how does Oppenheimer compares to real life?

Rose: Well, I can't say I knew Oppenheimer because I was born in 1972. But what I would say is Secretary Granholm and myself played a pretty interesting part in the whole issue. You may be aware that over the last ten years or longer, a number of members of Congress to include Senator Patrick Leahy and others really believe that Oppenheimer did not get a fair hearing by the Atomic Energy Commission. Now, Oppenheimer, as you saw in the movie, read in the book by Kai Bird, he was a complicated individual. He didn't do everything right. However, over the past year, past couple of years, people said, we need to look at this. And, you know, in many ways the movie was an impetus to relook at this issue. And I think we received a letter, or the secretary received a letter, and she -- from about 20 members of Congress asking her to reverse the decision. It came to me to kind of figure out a way ahead. And, you know, I started personally going back through the records, talking to people and wrote a memo for the for the secretary. Secretary looked at it, and to her credit, she really spent a lot of time on this issue. And she asked our general counsel folks to take a hard look at this. They did. Came back to her with a recommendation that she vacate the decision because the Atomic Energy Commission did not give him a fair hearing. And based on the recommendation by the general counsel, about a year ago, she vacated the decision. And you can find that on the DOE website. My joke to Secretary Granholm was, madam, madam secretary, who's going to play you in the movie? But, it's a, it was, I think it was a long overdue decision. Again, Oppenheimer didn't do everything right. But honestly, his contributions to this country and the security of the West are, you know, insurmountable. And furthermore, he didn't get a fair hearing, so I'm so glad I could be a minor part in helping correct the historical record.

O'Hanlon: Who's going to play you in the movie? Got some ideas.

Rose: Oh, Denzel Washington, I think Denzel Washington.

O'Hanlon: That's who I was thinking. We got about two more minutes. That was also an excellent answer to an excellent question. And I didn't appreciate all that history and that you were involved in this. Anyone else with a final question for -- Okay, let's go over here to the I take both of these together and then we'll see if Frank can wrap up. So the second row and the third row, please.

Audience Question: Hello, my name is Iris with DTRA. And my question is, how does China's increased mining foreign ownership of rare elements and minerals affect our ability to plan for and produce weapons of mass destruction?

O'Hanlon: If you don't mind, we'll take the other one. Yeah. Same time.

Audience Question: Thanks, Jeff Price Johns Hopkins SEIS. Good to see you and Mike.

Rose: Good to see you Jeff.

Audience Question: So a little bit outside the scope, but you've kind of answered the question on nuclear testing, but Putin keeps coming back to this. Yeah. And I don't know if you have any insights you can share on what the burr under his saddle seems to be about, accusing us of testing whether it's preparation for him testing. And second, the Ukraine war has resulted in the use of all kinds of dual-capable delivery systems and the like, and I know that there's thinking going on as to the implications of, not just on arms control, where they don't want us to do inspections, but also, you know, potential testing, evaluation of missile defense and delivery systems, and if that has any impact on the work that you're doing.

Rose: Great. Well, Jeff, great to see you. Jeff, I don't know if you remember, but like 30 years ago, I interviewed for a job with you. Do you remember that? He didn't give me the job, but he was my friend anyway. Yeah, well, you know, it's so funny. It's just a lesson I tell the young folks. I mean, you know, when you're, like, in your early 20s, you think, oh my God, if I don't get this job or I don't go to that school, the world is going to end. But then as you get older, you learn that when one door closes, another opens up. Really funny story, and then I'll answer your question. Yeah. Well, it's so funny. When I was 17 years old, the one thing I wanted to do more than anything else was go to the Georgetown School of Foreign Service. Okay? That was my thing. And guess what? I didn't get in. But you know where I was when I was 17 and I didn't get into Georgetown? I was at the Parker House Hotel -- and my Boston's coming out there -- and in Massachusetts, at a fundraiser for then-Senator John Kerry. And 25 years later, Secretary of State John Kerry is swearing me in as assistant secretary of state for arms control. And I finally got my revenge on Georgetown because they invited me to teach there. So I told my Georgetown class -- I taught on outer space while I was here at Brookings -- this is the Georgetown reject's revenge. To your two questions: Honestly, Jeff, I don't, I can't read Putin's mind. However, if you look at what he has said and done over the

last year or so or 18 months with regards to nuclear weapons, it's not a very promising picture. They have suspended their implementation of the New START treaty, though they have agreed to maintain the overarching limits. They have de-ratified the Comprehensive Test Ban Treaty. They continue to make threats to use nuclear weapons. Something's going on there. What it tells me is, given his threats and actions, maintaining a safe, secure, effective and reliable nuclear deterrent is critical to the security of the United States and our allies and partners. That said, we also need to maintain channels of communication with regard to arms control, risk reduction. And I will tell you, we are trying to talk to the Russians. But quite frankly, every time we try to engage on these issues, we are rebuffed. And the central message we hear back from the Russians is this: given the situation in Ukraine, everything else revolves around that. And that's very disturbing, as you know, Jeff, you know, throughout the Cold War, there were lots of, of wars going on. But we continued to engage in discussions on arms control and risk reduction with the Soviet Union. Unfortunately, that does not seem to be happening today. And that makes me very, very concerned. With regards to to your question on minerals in China. Unfortunately, I can't talk about where we get all of our minerals, but what I would, would say is that I am thoroughly convinced that we have access to all the capabilities we need to maintain a safe, secure, and effective nuclear deterrent.

O'Hanlon: Fantastic. With apologies to the rest of you had your hands up. Let me ask you to please join me in thanking Frank Rose.