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THE TRUMP ADMINISTRATION'S NUCLEAR POSTURE REVIEW:
CONTINUITY AND CHANGE

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P R O C E E D I N G S

MR. O'HANLON: Good morning, everyone. And welcome to Brookings. I'm Mike O'Hanlon with the Foreign Policy program.

We are thrilled to have you all here today, to discuss the "Trump Administration's Nuclear Posture Review", an important document that just came out on Groundhog's Day, February 2nd of this year, following the earlier National Security Strategy of December, and the National Defense Strategy of January, so the administration is really doing a nice job keeping its clockwork, running smoothly, and issuing all this guidance prior to now, the unveiling of its budget request.

We are thrilled to have David Trachtenberg beginning our discussion today. He has one of the longer titles, but one the more important titles in the Pentagon. He's the principal deputy under secretary of defense for policy. A job that Jim Miller also had, and we'll talk about that in our panel that follows with Jim and others.

But for now I want to introduce David, who has been one of the administration's most important authors and voices on the conceptualization, and framing, and writing of this document that we now have available that, by the way, all of you can access, as you're well aware, on the Internet.

It's about a 70-page document, it's much longer than the unclassified version of the National Defense Strategy, it has a lot of elaboration of Trump administration thinking on a number of issues, and we are going to hear about that today. David will give some short remarks, then field some of your questions, and then will swap out a little before the 11:00 o'clock mark for our panel discussion that I'll moderate, and then I'll introduce the panelists for, when we get to that point.

Let me just say a couple more things about David. This is his second, or third, or fourth time in government, he was also an important figure in the Bush administration, working on International Security Policy, which means he was thinking a lot

about relations with NATO and other allies, and thinking about their Nuclear Posture Review, of the early 2000s, that he was also an important contributor towards.

He hails from California by way of college, went to U.S.C., studied foreign service at Georgetown, was involved in a number of jobs in Washington, as I mentioned earlier, including most recently with Shortwaver Consulting, a job that he held just before joining the Trump administration last summer, when he was confirmed by the U.S. Senate for this job.

So, without further ado, please welcome, Mr. David Trachtenberg.

(Applause)

MR. TRACHTENBERG: Thank you very much. Thank you, Michael. It's a pleasure to be here at Brookings, I very much appreciate the invitation, and it's good to see so many people out here on such a dreary morning. Thank you for making the trek out here to participate in this. It's really good to be here, and it's been a while since I've been here, and I always appreciate the opportunity to come back.

One correction I would note, to Michael's very, very generous introduction, and that is my title, which was, indeed the Principal Deputy Under Secretary of Defense for Policy, has now been changed to actually been shortened by one word, thanks to the National Defense Authorization Act, which was signed into law a couple of months ago, or so.

The word "principal" has now been dropped from all the Deputy Under Secretary titles, because there is only one Deputy Under Secretary, and so now I have a better chance of actually fitting my title on a business card. So, as the Deputy Under Secretary of Defense for Policy, again, it is my pleasure to be here, and to talk about this very critical, very critical issue, the Nuclear Posture Review.

As you all know, each post-Cold War President has early, in his first term, conducted a review of U.S. nuclear policy posture and programs. President Trump's first National Security Presidential Memorandum, issued one week into the new administration

directed Secretary Mattis to undertake the fourth such review of U.S. nuclear policy.

The aim of the review was to ensure the United States' nuclear deterrent is modern, robust, flexible, resilient, ready and appropriately tailored to deter 21st Century threats and reassure allies. The Department of Defense conducted this review, along with the Department of State and Energy, and in consultation with allies and experts from inside and outside the government.

The resulting 2018 Nuclear Posture Review establishes the Department of Defense's priority, as maintaining a safe and effective nuclear arsenal that can effectively contribute to four key goals; deterring nuclear and non-nuclear attack, assuring allies and partners, achieving U.S. objective should deterrence fail, and hedging against an uncertain future.

The NPR also emphasizes that U.S. nuclear policy will continue to contribute to U.S. nuclear non-proliferation goals. Now, these roles are consistent with past priorities of U.S. nuclear policy. Indeed, the 2018 NPR maintains long-standing nuclear policies adopted by both Democratic and Republican administrations.

For example, the new NPR recognizes the need for nuclear triad, and sustains the previous administration's plan for modernizing the aging U.S. nuclear triad of land-based, sea-based and air-breathing delivery platforms. As well as it's supporting nuclear infrastructure and command and control.

Consistent with the 2010 NPR conducted by the prior administration, the 2018 NPR declares that the United States would only consider using nuclear weapons in extreme circumstances, to defend U.S. vital interest. In addition, the NPR also reaffirms the U.S. commitment to arms control, and non-proliferation by maintaining support for the Nuclear Non-Proliferation Treaty, and by sustaining the extended deterrent for allies. Extended deterrence is critical to their security, and promotes nuclear non-proliferation by checking their need to acquire their own nuclear weapons.

Now, each of the previous NPRs has rightly emphasized that U.S. nuclear policy must be responsive to the threat environment of its time. The 2018 NPR addresses the reality that while the Cold War has been over for decades, a much more challenging nuclear threat environment has developed since the previous 2010 Nuclear Posture Review.

This is the reality that confronted the new administration when it began its Nuclear Posture Review. Accordingly, the 2018 NPR is grounded in a realistic assessment of the contemporary security environment, one that recognizes a return of great-power competition, and the increasing salience of nuclear weapons in the arsenals and doctrines of potential adversaries.

For example, since 2010 the Russian leadership has made repeated, explicit nuclear threats to U.S. NATO allies and others, brandishing Russian nuclear weapons in a way we really had not seen since the height of the Cold War. Russia is actively modernizing and expanding its strategic and non-strategic nuclear weapons, and doing so in continuing violation of the landmark 1987 Intermediate-Range Nuclear Forces, or INF Treaty.

Like Russia, China is pursuing expansionist moves at the expense of its neighbors, including key U.S. allies, and doing so also through the threat of force. China also continues to expand its nuclear capabilities in both quantity and quality. Since 2010 China has announced the development of, or fielded, new ICBMs and theater-range ballistic missiles, a new sea-launched ballistic missile, a new ballistic missile submarine, and a new strategic bomber.

China's intentional lack of transparency regarding the scope and scale of its nuclear modernization serves only to magnify uncertainties about its future intent. Also, since 2010 North Korea has rapidly increased the pace of its nuclear testing, and of theater, intercontinental and submarine-launched ballistic missiles.

At the same time North Korea has repeatedly made explicit nuclear threats to the United States and our allies in the region. And while Iran's nuclear future remains

uncertain, its maligned activities and hegemonic aspirations in the Middle East are not.

Now, in contrast to these developments over the past decade, the United States has built no new types of nuclear weapons or delivery systems, other than the F35, for the past two decades. We have, instead, sustained our nuclear deterrent with life extension programs keeping systems and platforms beyond, decades beyond their designed service life.

Former Secretary of Defense, Ash Carter, rightly observed, that if there is an arms race underway the United States clearly is not a participant.

It is clear that our attempts to lead by example, in reducing the numbers and salience of nuclear weapons in the world, have not been reciprocated. Since the 2010 NPR, the prospects for great power military confrontation have expanded, while both Russia and China have increased the number and salience of their nuclear weapons programs.

The intentional restraint reflected in U.S. nuclear policies did not lead the rest of the world to follow the same path. Now this is not a unique conclusion reflected in the 2018 Nuclear Posture Review.

The U.S. National Intelligence Council recognized this great difference in the U.S. and Russian approaches to nuclear weapons back in 2012, concluding, "Nuclear ambitions in the U.S. and Russia over the last 20 years have evolved in opposite directions. Reducing the role of nuclear weapons in U.S. security strategy is a U.S. objective, while Russia is pursuing new concepts and capabilities for expanding the role of nuclear weapons in its security strategy."

The 2018 NPR response to this increasingly challenging threat environment, not by changing long-standing tenets of U.S. nuclear policy that have bipartisan support, but by emphasizing the maintenance of those capabilities needed to effectively deter war in the current environment. It also seeks to clarify U.S. policies to help remove the potential for a mistake in calculation by potential adversaries that limited nuclear first-use threats or

escalation, can provide them with any possible useful political or military advantage.

Correcting the potential for such calculations is now a key to maintaining deterrence of nuclear war. In this regard, I'd like to address three of the corresponding outcomes of the 2018 NPR; the clarification of our nuclear policy, and the recommended supplements to U.S. deterrence capabilities, all of which have been subject to considerable news accounts, and what I would consider to be considerable mischaracterizations in much of the public commentary.

First, let me say the 2018 NPR deterrence of nuclear attack against us, our allies and partners to the top priority of U.S. nuclear policy. Given the security environments, and the changes in that environment that I have highlighted, this is a prudent realistic and, I would argue, necessary change.

Second, to strengthen deterrence of nuclear and non-nuclear strategies attacks, the 2018 NPR clarifies U.S. declaratory policy regarding nuclear weapons. Doing so does not expand the circumstances for nuclear use, or lower the nuclear threshold as some commentators have suggested. Rather, while maintaining a measure of ambiguity, it provides some clarification regarding what might constitute an extreme circumstance that could lead to U.S. consideration of a possible nuclear response.

This clarification enhances deterrence and raises the nuclear threshold by reducing the potential for adversary miscalculation. As potential adversary non-nuclear capabilities continue to become more and more lethal, U.S. policy must make clear that non-nuclear strategic attacks, that would have catastrophic effects on the American people and our allies, must also be deterred.

Finally, in addition to prioritizing deterrence, and adding some clarity to extreme circumstances, the 2018 NPR also recommends two nuclear programs to strengthen U.S. capabilities to deter attacks, and to assure allies.

First, is the modification of a small number of existing submarine-launched

ballistic missiles to include a low-yield option. Second, is the pursuit of a nuclear sea-launched cruise missile. Despite the awesome capabilities of our existing nuclear triad, Russia's actions indicate that Moscow may hold the mistaken belief that its numerous and diverse non-strategic nuclear arsenal provides useful options for limited first-use nuclear threats for employment.

We believe the two supplements to the U.S. nuclear arsenal presented in the NPR are important to help correct this misperception, and convince Russia, and any other potential adversary, that the United States and its allies will not be coerced by the threat of limited nuclear first use.

Now, the other point I would make, is that neither of these capabilities, these two supplemental capabilities, is a new capability. The low-yield option for submarine-launched ballistic missiles, involves a relatively minor modification to an existing warhead. And the sea-launched cruise missile is a capability that the United States possessed for decades, until recently.

In addition, neither of these capabilities will require underground nuclear testing, and both are compliant with all U.S. Treaty obligations. These capabilities are intended to strengthen the deterrence of war, and the assurance of allies, thereby helping to ensure that nuclear weapons are not employed or proliferated. We must recognize that effective deterrence is about tailoring our capabilities to a potential adversary's calculations regarding the use of nuclear force to ensure that it can never appear to be a useful option.

We must assess our capabilities relative to the doctrine, exercises, statements, threats and behavior of potential adversaries, and the capabilities recommended by the 2018 NPR are tailored to raise the threshold for nuclear use and to do so with minimal changes to the U.S. nuclear posture.

We believe the policy announced in the NPR is a reasonable response to the changes in the current security environment. And let me be clear, the goal of our

recommendations, the goal of the recommendations contained in the 2018 NPR is to deter war, not to fight one.

Modernization of the U.S. nuclear deterrent, adoption of tailored defense strategies with flexible capabilities and clarification of the role of nuclear weapons, all send a strong deterrence message to potential adversaries, while also reassuring our allies.

Finally, the 2018 NPR helps ensure that our diplomats speak from a position of strength. Russia has little incentive to negotiate seriously about nuclear reductions without a robust and ongoing U.S. nuclear modernization program. Indeed, Russian leaders have said as much. And as Secretary Mattis recently testified, Russia is unlikely to give up something to gain nothing.

Critics who favor eliminating U.S. systems in the face of an expansive Russian nuclear modernization effort, are undermining America's greatest bargaining leverage and the prospects for future arms agreements. The 2018 Nuclear Posture Review is one of several important, reinforcing U.S. national security documents, meant to guide U.S. policy in an increasingly complex and challenging world.

Much as we might prefer otherwise, U.S. nuclear weapons are the bedrock of American and allied security. As Colin Gray has said, "Nuclear weapons are a regrettable necessity in the real world." After the slaughter of two world wars, they have prevented large-scale great-power conflict for more than seven decades. In an era of renewed great-power competition, adversaries, allies, and the American people should know that the United States has the will, and the flexible resilient nuclear forces needed to protect the peace.

Before turning things back over to Michael and panel here for discussion, let me again take this opportunity to thank the Brookings Institution for the opportunity to come here today to briefly present the Department's work, and to engage in an informed discussion on these issues that are tremendously vital to our nation's security.

I appreciate your being here, and your attention, and I look forward to your

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questions and insights. Thank you all very much. (Applause) Questions? Comments? Suggestions? Recommendations? Yes, sir?

MR. O'HANLON: Please wait for a microphone if you could, so we can get this immortalized on C-SPAN.

QUESTIONER: Thank you. If you are going to get involved in a low-yield weapon exchange, how do you figure you're going to prevent it from escalating to the more conventional size nuclear weapons?

MR. TRACHTENBERG: I don't think of it in terms of getting involved in an exchange at all. The way we look at this, again, is what we are trying to do is we are trying to prevent an exchange, not engage in one. And therefore it's incumbent upon us to think about how do we do that in a world that has changed dramatically since the last NPR was done, and reflects developments by Russia and other states that tend to suggest increased reliance on nuclear weapons, and the possibility that nuclear weapons, even in a limited way, might have some degree of political or military utility.

And so the recommendations that we are proposing to include a low-yield ballistic missile, and a sea-launched nuclear-armed cruise missile, are intended not to engage or not to fight a nuclear, or not to even suggest that one could be fought in a way that is limited, however one wants to define the term limited, but are designed to try to convince adversaries and potential opponents that they should not feel that they have some exploitable advantage by using a capability for which the United States has no counter.

So, the very purpose of what we are doing is war prevention, not war fighting, and I understand the characterizations, many of the characterizations that I've seen tend to suggest that what we are looking to do is engage in precisely the kind of limited strikes that your question suggests. I'd suggest looking at it differently. What we are trying to do is prevent an opponent from believing that such a course of action is actually useful or beneficial.

QUESTIONER: So, you believe a small deterrent is more effective than a big deterrent? I'm talking about the size of nuclear weapons, the size of the yield of nuclear weapons.

MR. TRACHTENBERG: Sure. What we believe is having flexible nuclear capabilities tailored to specific circumstances makes the most sense for deterrence and for assurance. Obviously, no two states are alike, we have multiple threats that we are trying to deter, and to do that may take flexible capabilities. In some cases, certain types of military capabilities maybe sufficient for deterrence, in other cases opponents may see them as less sufficient.

So, what we are trying to do is ensure that there is a necessary flexibility and resilience and robustness in terms of the capabilities we have at our disposal, in order to deter, to sway opponents from believing they have any kind of military advantage that they believe they can use either to initiate conflict or escalate conflict. That is the entire purpose of the recommendations that you find in the 2018 Nuclear Posture Review. Sir?

QUESTIONER: Hi. Thank you. I would like to know if you are concerned that enhancing nuclear capabilities can be seen as a contradiction to the commitment that you mentioned of non-proliferation agreements, and if it can also promote an arms race?

MR. TRACHTENBERG: I would answer this way. First of all, I don't see it as a contradiction whatsoever. In fact, I mentioned our extended deterrent that we extend to over two dozen-plus allies overseas. I would argue that our nuclear arsenal, the arsenal that we have that serves that extended deterrent function is quite possibly the most successful non-proliferation tool we've had in our tool kit literally for decades, because it has dissuaded friends and allies from feeling the need to develop or acquire nuclear weapons of their own. So, from a non-proliferation standpoint, the nuclear capabilities we have I think very much support the U.S. non-proliferation objectives.

In terms of the question about an arms race, I've seen that commentary as

well a number of times. I go back to the statement that I read from Former Secretary of Defense, Ash Carter, there's an arms race the United States is not participating. And in fact, the United States has not been participating for quite some time.

If you look at the details of what the Russian Federation has been doing in terms of its own nuclear modernization program, if you look at Russian military doctrine, if you look at the exercises, the strategic force exercises that Russia has conducted, a number of which really have been unrivaled since the days of the Cold War.

A number of which involved the exercise of their strategic nuclear forces, and in fact the simulated use, first use of nuclear weapons. If you look at all of the systems that the Russians have been engaged in modernizing in recent years, it's very difficult for me to understand how -- what we are proposing to do in this Nuclear Posture Review in terms of maintaining the efficacy of the existing triad and developing these two supplemental == I believe, very modest supplemental capabilities that I mentioned, in any way, shape or form heralds an arms race.

We are not looking to match what Russia is doing, weapon for weapon, we are not looking to build up the thousands of non-strategic nuclear weapons that the Russians have in their arsenal. Again, what we are trying to do, is we are trying to convince potential adversaries, whether it be Russia, China, North Korea, whomever, that there is no benefit to them of pursuing a course of action which could lead -- which might lead to their actual use of nuclear weapons first, or in some kind of, so-called limited way.

What we want to do is make absolutely certain that the cost to an opponent, to an aggressor, of any nuclear use far outweigh any perceived benefits that they might think would accrue to them. That is the essence of what we have recommended in this NPR. And, again, I would argue it's relatively consistent with sort of the traditional U.S. nuclear policies as they have evolved over many decades.

So, again, I think there is much more continuity to this particular NPR, and its

conclusions and recommendations, vis-à-vis prior NPRs than differences. There's a lot of continuity there, and that continuity has been occasionally overlooked.

QUESTIONER: Thank you, sir. I come from a country that was under an extended nuclear deterrence relationship with the United States, New Zealand, but then decided that our security would be better if we were non-nuclear, and not a nuclear target, so we withdrew from that nuclear deterrence relationship, and we'll now sign the new treaty on the Prohibition of Nuclear Weapons. Would you be supportive of other of the allies of the United States deciding that, for their national interest they would be more secure not to be in a nuclear alliance? And also signing the Treaty on the Prohibition of Nuclear Weapons?

MR. TRACHTENBERG: Well, of course it's up to individual states and individual allies to decide what approach they want to take. But I will tell you, we've had similar discussions and debates in the NATO context for many years, and NATO remains a nuclear alliance. I don't see that changing in the near future.

There's a general recognition among allies that nuclear deterrence remains important. I think there's also a general recognition that because of some of the changes that I alluded to, that have taken place in the world environment in recent years, the issue of preventing nuclear conflict has taken on a growing importance, and the role of nuclear weapons in doing that, is also generally recognized by allies.

So, I don't want to obviously speak for what other countries should or shouldn't do, but I think it's clear not only to the United States, but it's clear to U.S. allies abroad as well, many of whom share our threat perceptions and understanding of some of the dangers that we see posed by others, and share our recognition that it is critically important, perhaps more so now than ever before, to make sure we have the wherewithal, and the capabilities, and the resolve, to ensure that potential adversaries do not miscalculate, and do not believe they have some kind of advantage to -- that is exploitable that they can take advantage of.

So, again, I think that is in the sort of mainstream of U.S. nuclear tradition. I don't see anything odd or unusual about that. But, again, whether we like nuclear weapons, or we don't, we might all wish that we lived in a world without them, but we also have to recognize reality, and the reality is nuclear weapons do exist.

Some states have gone in a direction quite opposite the direction that the United States has gone, in terms of size of its nuclear arsenal, and it's attention to its focus on nuclear weapons as part of the national security strategy. That's a disquieting development, in my view, and it's one that we need to be forthright in confronting, straightforward. Yes, sir?

QUESTIONER: I appreciate your presentation. Thank you for it. And I've learned a lot from it. But I wonder whether your approach may in fact run afoul of some of the very things that you warn other people about, particularly thinking about how other countries will view our strategy. When we decide to build new non-strategic nuclear weapons, why will that not appear to Russia and to other countries to be a ratification of their new strategy of escalation to deescalate, and an acceptance of limited nuclear war?

And why is it that that the administration decided to focus only, or predominantly, upon nuclear responses to a possible limited nuclear attack, rather than looking to the area of conventional response in which we have such an overwhelming superiority. Remembering of course, that in old days, when we thought the Russians had conventional superiority, we were the ones who believed in first strike?

MR. TRACHTENBERG: Let me say this, there is nothing in the Nuclear Posture Review that assumes an automatic nuclear response to any particular contingency. There is an element of strategic ambiguity there which absolutely does not rule out our ability to respond in other ways as well, in ways of our choosing, appropriately to the nature of the threat that we face. That could be response with conventional arms, it could be some other type of response, there is nothing in the NPR that says, the United States, under this or that

circumstance, will respond with nuclear weapons. There's no automaticity there.

And so your point about other possible types of response is certainly valid, and it's not negated by anything in the Nuclear Posture Review. Why is the focus of this review on nuclear weapons, because it is a Nuclear Posture Review, and the tasking was to review U.S. nuclear posture. And so, that of course is what the review did.

In terms of the possible reactions of Russia, China and other states, I have no doubt that anything that the United States does or proposes to do would likely generate negative reactions on the parts of those who would prefer the United States not to take any action at all, to bolster or improve its nuclear deterrent capabilities.

So, it's not surprising to read or hear statements from Russian officials, or Chinese officials, or North Korean officials, critical of the Nuclear Posture Review, and suggesting that the Nuclear Posture Review does precisely the opposite of what it is intended to do. But I think the document itself has to be taken as a whole, and I think the context that is provided within the review itself, in terms of our assessment of the overall nuclear security environment, provides a realistic framework and rationale for understanding why we have come to the conclusions and recommendations we have come to.

Now, look, I realize certainly reasonable people can have reasonable disagreements over this or that specific recommendation, or the rationale behind it. That's what makes debate over this issue so robust. But nevertheless, I would encourage everyone, if you haven't read the full document; I'd encourage you to do that. Take a look at how the security environment is described, and assess the conclusions and recommendations of the NPR in the context of our assessment.

See whether or not it holds together and make sense as you do that. I think that it's a logical approach, I think it is a rational approach, and I think it's an approach that is, in fact, tailored to the kinds of 21st Century threats we currently confront, and are likely to confront in the future.

So, regardless of what some opponents might suggest, I think we've kind of hit it right in this particular review. I think it's balanced, I think it's consistent with what U.S. nuclear policy has been by and large for decades, and I think it's appropriately tailored to the different threats that we face today. Sure, Bob?

MR. EINHORN: Dave, thanks so much for joining us Brookings today, and making the case for the Trump NPR. To achieve its ambitious objectives, modernization of the triad, the DOE nuclear complex, command and control system, the supplements you mentioned, and so forth, these are expensive -- you know, it's a high price tag associated with them. You are going to need strong, bipartisan support in the U.S. Congress. Presumably you and other senior officials have engaged in consultations with Members of Congress to make the case for the NPR, and to get their support.

How have those consultations gone? Are you confident that you're going to have the necessary domestic consensus for this ambitious program? And what are the particular challenges? What are the two or three challenges? You know, when you think of the talking points you're going to use in the Congress, what are the challenges you need to confront?

MR. TRACHTENBERG: A very good question. And I would say so far, our discussions with others, with folks on The Hill and elsewhere, Democrats, Republicans, I would generally characterize them as overwhelmingly positive. Obviously not everybody supports everything that we have proposed here in the Nuclear Posture Review. There are some that believe we go too far, there are others who believe we don't go far enough which, again, just goes to show you, in Washington you can't please everyone, you know, all of the time.

But I think by and large, I have been quite pleased by what I have seen as, generally, bipartisan support for what we have done, and what we are attempting to do with this particular NPR. Again, it's not, you know, universal, but it's quite substantial, I would

argue.

The biggest challenge is, I think, are several-fold. Number one, explaining the rationale behind what it is we are proposing, in a way that is understandable. This is of course, and everyone here in this knows it, it's a very esoteric issue. But it's an issue because of that, it's also an issue that occasionally lends itself to mischaracterization or misinterpretation.

Explaining what we are proposing to do, and why we are proposing to do it, in a way that makes sense to multiple audiences, I think is a challenge, but it's critically important to do, if we are going to, not only generate but maintain a level of bipartisan support that is needed to actually carry out the recommendations that we have proposed here.

The other challenge of course, and you alluded to it in your question, is the issue of funding. No question that what we are talking about carries a substantial price tag. Just the very modernization of our existing triad is not an inexpensive undertaking. Relatively speaking, to other things that we spend defense dollars on, it's a relatively minor fraction overall of the defense budget. Maybe some 3 to 4 percent, which historically is rather low if you look at past periods of modernization and recapitalization of the triad.

So, from my perspective, it's not so much a question of affordability, we can afford to do what we need to do, when we are talking about situating the issues as preventing nuclear war.

Secretary Mattis likes to say, we can afford survival, and he's absolutely right. We can afford to do that, we simply need to be able to, number one, understand that doing so will require time. This is not something that will be done overnight, and it will require a commitment of resources that must be sustained over a period of time to get us to the point where we've actually achieved the objectives we've set forth.

That in itself is a reasonably heavy lift. I would argue that as difficult as it was for us to spend the last year sort of constructing the NPR in a way that is reflective of the

current security environment that was probably the easy part. Now that we've done it, the easy part is over, the hard part will be trying to ensure that the recommendations are sustainable, and actually carried out, in order to accomplish the objectives that we set forth from a policy prescription.

So, the challenge is just beginning. And by the way, this is a challenge that will go -- last well beyond this administration into the next administration. Again, this is not something that can be done overnight or with a flick of a switch.

MR. O'HANLON: So, I'll now ask the panel to join me on stage. We are not going to take any break; we'll just go straight into that. But please join me as well, in thanking Secretary Trachtenberg. (Applause)

Well, thank you, everybody, for staying on with us; and our thanks to Secretary Trachtenberg. But I'd like to very briefly now introduce the distinguished panel we have up here. We'll go straight into our discussion. We don't have a lot of time, we'll be here until 12:00, and we'll have the last half-an-hour or so for your questions. So, let me very briefly introduce folks, and then we'll go down the line with some questions tailored to each. Have another round of discussion here and then go to you.

Just to my left is Madelyn Creedon, she was, and in this case the word Principal Deputy I think does apply, Principal Deputy Administration of the Department of Energy's main arm that works on the nuclear warheads of our arsenal, the National Nuclear Security Administration. And so a lot of the issues concerning warhead modernization, or the potential need to beef up the warhead complex in case we need to modernize and expand in the future, which the NPR addresses, will be questions that I'll want to pose to Secretary Creedon. She also has considerable experience at the Department of Defense where she was an Assistant Secretary, and also on Capitol Hill.

In fact, that's one of the distinguishing characteristics of almost everybody up here today, is Capitol Hill experience as well, which is important for the reason Bob Einhorn

got out a minute ago, as we think about resources.

Now, just to Madelyn's left is Dr. Jim Miller, who was Under Secretary of Defense for Policy in the Obama administration. Prior to that he was Principal Deputy Under Secretary of Defense for Policy under Michèle Flournoy, in the first term when he helped write the Nuclear Posture Review of 2010, that we've heard referenced several times. That was the previous NPR.

And my opening question for Jim, and for the panel, in general, is going to be, in fact, how much continuity is there from the 2010 NPR and how much changed. And we'll get to that in just a moment. One more point on Jim, if you read his bio, you'll also notice, just as General Martin Dempsey did in the farewell speech he gave for Jim, that Jim was an excellent tennis player at Stanford. And I can attest to that. If you see the scar on my face, this, only with slight exaggeration, Jim, running me into the wall of the indoor facility with his slice second serve to the ad court; but that's just a personal a note, that I appreciate the indulgence.

Just too, at Jim's left is Bob Einhorn, who had a distinguished career in government, but has come in and out of think tanks, and done a lot of academic writing throughout his career as well. He's currently here with me as Brookings as another Senior Fellow in the Foreign Policy Program, just as I am.

Bob was Hillary Clinton Main Advisor on non-proliferation strategy, and worked very hard on issues like North Korea and Iran, as well as arms control treaties, more generally, and the Obama administration; had been at CSIS, had been in the Clinton administration. A great, distinguished career, I think it began at the Arms Control and Disarmament Agency back in the 1980s, and has done many things since.

And finally, James Acton, a Physicist by training, a Senior Fellow at the Carnegie Endowment, holds the Jessica Matthews Chair there, and has done a lot of the most rigorous, technical writing on arms control, including on broad subjects, such as the

potential long-term hope for completely nuclear disarmament; but also of questions, of how do we build a stabilizing, safe and secure deterrent in the meantime.

So, thrilled to have them all here; and Dr. Miller, if I could begin with you, please? I would be really fascinated to hear your comparison of the 2010 NPR to this one? Just how much change, how much continuity?

MR. MILLER: Thank you, Michael. And thanks for your very kind introduction and exaggeration of my tennis capabilities. Mike was actually a terrifically talented player as well as an intellect. So, three quick points on the 2018 Nuclear Posture Review, relative to the 2010 Review: first is that there is a very strong thread of continuity, both with respect to the policy, and with respect to the programs of the reviews.

At the policy level this NPR reiterates what the 2010 Nuclear Posture Review had to say about the U.S. policy toward the employment of nuclear weapons, and that is that the nuclear weapons would be used only under extreme circumstances, that threaten the U.S. vital interests, or the vital interests of our allies and partners.

This nuclear posture here reiterates the so-called negative security assurance, which says that the United States will not use or threaten to use nuclear weapons against non-nuclear weapon states that are compliant with their Non-Proliferation Treaty obligations.

And finally, this review, like the past review, rejects no first use, or so-called sole purpose for nuclear weapons, but makes clear, in my view, that the fundamental role of nuclear weapons is to deter nuclear weapons use. So, at the policy level, a lot of consistency and similarly, the support of arms control, including New START and a desire to return the Russians to compliance with the INF Treaty in support of non-proliferation as well.

And finally, a reiteration that the United States will abide by the Comprehensive Nuclear-Test-Ban Treaty to not seek nuclear testing, although this administration says it will not pursue a ratification of that treaty.

So, from a policy perspective, a tremendous amount of continuity, and then on the programmatic side, similarly, focus on sustaining and now modernizing the triad, ICBMs, SOBMs, heavy bombers, and the related weapons. A real priority on investing in survivable nuclear command and control which is also critically important for nuclear stability, and this is very much in Madelyn's area of expertise, continuing to invest in the nuclear infrastructure that NNSA and the Department of Energy are responsible for, so, in all of those areas, continuity, and I think that's fundamentally important.

The place where we see the changes in the two weapon systems that David Trachtenberg mentioned. First, a low-yield SOBM, and second, and over a longer time frame, nuclear-tipped sea-launched cruise missile, which I hope will be deployed solely on submarines not on surface ships, because of the greater stability and survivability. I want to defer on those issues, and we can come back to those.

The third point I want to make is that this is -- there's an important difference, and there's no question that the 2010 Nuclear Posture Review was President Obama's Nuclear Posture Review. He had given the Prague Speech, Secretary Gates, forward to the 2010 Nuclear Posture Review noted that this was an implementing mechanism for the Prague Speech.

There is a question, and we'll learn over time, I suppose. Does this 2018 Nuclear Posture Review signed by Secretary Mattis, does it represent the views of President Trump? President Trump's comments about having a bigger nuclear button, about bringing fire and fury to bear on North Korea in response to any aggression, cause one to wonder if that's the case. I hope that it is the case. Time will tell.

MR. O'HANLON: Thank you. One additional question, I think you laid that out very clearly and conceptually, and in a good frame, but I want to understand one further point. To the extent the Trump administration, or Secretary Mattis, the nominal author of this document, to the extent they do talk about the 2010 NPR, they do seem to want to

emphasize continuity just as you have.

In those places where they acknowledge discontinuity, they seem to attribute that less to a difference in world view, Obama versus Trump, vision of nuclear disarmament versus, you know, big button, and they want to say more that it's that the world has changed since 2010, and we've seen in particular Russia's more aggressive behavior.

Do you accept that interpretation: that most of what's changed, to the extent there is change from 2010 to 2018, most of it is in the international security environment, rather than in the occupant of the White House here in Washington?

MR. MILLER: I can't speak to the involvement of the occupant of the White House in this review, as I noted. But I do agree that the world situation has changed substantially relative to 2010 when the Obama administration's Nuclear Posture Review was done. Most notably, North Korea has advanced its missile and nuclear capabilities, and I believe that's an important reason to look at bolstering our extended deterrence posture, the so-called U.S. Nuclear Umbrella.

And second, I also agree that Russia has continued to invest very substantially in tactical nuclear weapons, and has displayed those nuclear weapons, and its posture associated with them in multiple exercises, and its rhetoric has been such that thinking about how to bolster deterrence of Russian coercion or attack, using nuclear weapons is an appropriate and important focus of this review.

And I'll just say, well, I'm sure we'll talk about later, but I'll say, I think the steps that we'll take in this review with the low-yield SOBM weapon, and with the nuclear SLCM, both make good sense given those changes.

MR. O'HANLON: So, I do have one final follow-up, and then we'll move on to Bob Einhorn, and then Madelyn and James. You mentioned North Korea and Russia, you didn't mention China explicitly, of course you're being very concise and cogent. I want to give you a chance to speak now about China. One striking dimension of the national Security

Strategy, and then the National Defense Strategy of the Trump administration, they tend to paint China and Russia with a similar brush, and the NPR does a little bit of that as well.

Personally, I see China's nuclear behavior as much more restrained than Russia's. And so I'm a little bit concerned about the single brush. I wondered if you wanted to comment on that question as well.

MR. MILLER: Michael, I agree with your assessment. And my focus on North Korea and Russia was intentional. Both of them have advanced their nuclear capabilities over the last eight years, and each in its own way, is relying significantly on nuclear weapons, not only for deterrence, but for coercive capability.

China, as you know, has a no-first use nuclear policy. I find that relatively credible, and I believe that their behavior and their modernization programs are consistent with what one would expect, given their no-first-use policy. For a country that is a -- not just a, to be, rising great power, but is a great power today, and establishing a diverse set of capabilities so that The People's Republic of China leadership could be confident that they have a secured second-strike capability is a sensible set of steps, from my perspective. It would be surprising to me, if a great power took a different approach.

MR. O'HANLON: Thank you. Bob, let me turn to you. And again, we've been wrestling with the question of how much change how much continuity. I know you've been thinking a lot about declaratory posture. How would you sum up the overall situation? Do you see more continuity than change from this nuclear posture to what had preceded it?

MR. EINHORN: Thanks, Mike. The sum of both continuity and change, like the 2010 NPR, the 2018 NPR preserves the option for the United States to use nuclear weapons in response to both nuclear and non-nuclear aggression. As Jim just pointed out, both NPRs therefore reject the idea that deterrence of nuclear attack should be the sole purpose of U.S. nuclear weapons. So there's some continuity there.

Also, and David Trachtenberg mentioned this, like the 2010 NPR, the Trump

NPR says the United States will only consider the use of nuclear weapons in extreme circumstances when the vital interests of the United States, its allies and partners are at stake. But there's an important difference here, at least in my view. The 2018 NPR defines extreme circumstances more broadly, to include non-nuclear strategic attacks against U.S. allies, the United States and U.S. partners.

Now the Trump NPR doesn't really define non-nuclear strategic attack. It doesn't explain what would make a nuclear attack strategic. Instead, it provides some examples: non-nuclear attacks against civilian population centers, and critical civilian infrastructure, against early warning, command and control, attack assessment, capabilities.

Now, previously, before the current NPR, the U.S. maintained the option to use nuclear weapons in response to massive conventional aggression, to stave off a major strategic defeat. You know, for example, the Warsaw Pact overrunning Western Europe, China conquering Taiwan, North Korea crossing the DMZ and occupying Seoul.

The U.S. also preserves the option to use nuclear weapons in response to a non-nuclear WMD attack, equivalent to the use of nuclear weapons in lethality. Such as a truly mass-casualty biological weapons attack.

These circumstances, in my view, set a very high bar for the U.S. initiation of the use of nuclear weapons. The examples that are provided in the Trump NPR, I think, lowers the bar. The use of nuclear weapons in my view, would hardly be the most effective, proportionate or credible way to respond to, for example, conventional bombing of population centers, conventional or cyber attack against critical infrastructure, such as the electrical grid, or kinetic or cyber attack against warning or sea-cubed assets.

In my view, a better way to protect those potential targets is to make them more resilient, redundant or defensible, and to threaten to retaliate with more credible, but still highly potent non-nuclear means.

The Trump administration may believe that declaring a readiness to use

nuclear weapons in a wider range of circumstances will enhance deterrence, but I think such a declaratory policy has some significant downsides. If an adversary believes that the United States will use nuclear weapons early in a conflict, it may calculate that it's better off using nuclear weapons first.

And concerns that the administration may be increasing the role of nuclear weapons may -- if this perception were to become wide-spread in the American public, it could undermine the domestic consensus that is required to pursue the recapitalization of the U.S. deterrent.

The Trump administration may have been motivated, at least to some extent, by a political impulse to adopt a more robust approach to deterrence than its predecessors. But the 2018 NPR declaratory policy, may raise some serious questions about the administration's nuclear intentions, and might even do so without significantly increasing deterrence.

MR. O'HANLON: Bob, thank you. Just one follow-up for you; do you have a sense there were certain scenarios that administration may have had in mind of this sort non-nuclear strategic variety that they were really concerned about? That we had somehow underappreciated the severity, for example, high altitude nuclear burst, I guess that would be a nuclear attack, but the equivalent in the cyber realm, for example, that brought down much of our national electricity grid, and sort of put us on our heels as a nation for a year, or what have you, as we try to rebuild the electricity infrastructure.

Do you think it was specific scenarios like that? Or was it a broader sense of just wanting to, you know, leave a sharper contract with predecessors?

MR. EINHORN: I'm not sure of that, and I think the administration will be under pressure in the weeks and months to come, to begin to articulate what kinds of scenarios they would consider to be the kind of non-nuclear strategic that could warrant, you know, our consideration of nuclear use. I think some of the scenarios you mentioned are in

their minds, but clearly, the administration is going to be reluctant to be drawn out into specifics.

I think it believes that ambiguity enhances deterrence. But I think ambiguity can be confusing, and it could lead some U.S. adversaries to jump to the wrong conclusion that the U.S. really is prepared to initiate nuclear war early in a conventional conflict.

I think this is going to be, it may be difficult to sell a current declaratory policy. I think, you know, fortunately for the administration issues like the price tag of modernization, and the supplements, the nuclear SLCM, the low-yield SOBM, those are easier to grasp on to in the public debate.

A declaratory policy tends to be more abstract, more complicated, so maybe the administration may avoid some very searching questions. But I think, you know, in the kind of the strategic community, I think some of these questions about declaratory policy will become very prominent.

MR. O'HANLON: Thank you. So, Madelyn, I'd like to go to you, please. I would love to just first get your thoughts on explaining to us a little bit about what might be up with these new nuclear warhead concepts. And to the extent you want to talk about your understanding of those. So, Secretary Trachtenberg said that the SLBM, submarine-launched variant would be a minor modification to existing warhead type.

I guess we can all guess what that might mean, and maybe you're not comfortable in an open forum speculating yourself, but if you can give us any insight into how you can have a much lower-yield warhead, that's only a modest or minor modification. And then secondly, for this would be cruise missile warhead, what kind of timeframe do you sense might be required to get to a point where that would be feasible?

MS. CREEDON: Thanks, Michael. I want to actually start with another little twist.

MR. O'HANLON: Please.

MS. CREEDON: And really a bit of the emphasis on this. And that's really the lack of emphasis on non-proliferation, threat reduction, that was in the 2010 NPR, so in terms of tone, although as both Jim and Bob have said, a lot of the policies are relatively consistent. I think that this lack of emphasis on threat reduction and non-proliferation is telling.

And the reason I say that is the reason I say that is even though there is good language with respect to staying in New START, and both Russia and the U.S. have come into compliance now with New START, what's missing is really any commitment to the five-year extension, which is in New START.

So, I mean, I understand the reticence to have any further discussions with Russia on new treaties, Russia has made it very clear that they are not interested in that. But even the omission of the five-year extension I think is telling. Now, the reason I put all that there, is because I think it has a -- it does have some influence on the language that deals with the nuclear weapons' infrastructure at NNSA, because I think that is much more subtle in this NPR, but I think in many respects it is much different from the previous NPR.

So, we all know that the infrastructure at NNSA, large parts of it, it's very old, it's very outdated, it needs to be replaced, and it's been a long process to get -- and difficult and expensive to get some of that infrastructure going in terms of the replacement.

What NNSA has been doing, and this is more to your point, is that it has been doing the life extensions on the existing warheads. So, the plan, as I understand it from the NPR, is to take some number of the warhead for the D5, the ballistic missile on currently on the Columbia-class submarines. So, this W-76 is the one that's almost finished with the life extension, this was the first big life extension.

And my understanding is that they will do something too, that I actually don't know exactly what they are going to do to modify it so that it's not the single high yield, and that it will have, I think, based on the reading of this, is that it will have a single low-yield.

Now, what that actually is, isn't terribly clear, but based on some of the reading it's probably not a new warhead, but it is a new military purpose. Okay. So, you've got that debate.

The second piece is the supplement for the sea-launched cruise missile, so right now the Air Force and the NNSA, are developing an air-launched cruise missile, and have decided that the warhead on that air-launched cruise missile will be the modified W-80 which is what's currently on the air-launched cruise missile, and in fact was on the old TLAM, the old nuclear Tomahawk.

So, my guess would be that if this sea-launched cruise missile goes forward, that the warhead on that, just like in the past, would probably be the modified W80, which, once it's gone through that extension would be the W80-4.

The first production unit for the 80-4 is until 2024, so all of this is very much out there in terms of timing, and that first set of 80-4s is really going to be for the air-launched cruise missiles. So, again, if that's the way they go, that's not a new warhead, and in fact sort of a return to an old capability.

MR. O'HANLON: So, one more question for you before I go to James, who I hope may address this question as well, with your physicist background and your unclassified, like me, unclassified background and approach to these questions, you may be more willing or able to speculate about how you make an SLBM warhead with a much lower yield, without testing and without much work. But in any event, Madelyn, thank you very much.

I wanted to ask you about the fairly ambitious plans to modernize the Department of Energy, NNSA infrastructure that we see in this NPR. And it seems to me, as you point out, you were part of an administration that worked very hard, just as its two predecessors had, to sustain the U.S. nuclear arsenal without nuclear testing. The last time we tested was 1992. And that was a concept that was well accepted, we've been spending close to \$10 billion a year on science-based stockpile stewardship and also refurbishment,

we've done a lot of hard work, we continue to have major weapon slabs devoted to this, you oversaw a lot of that work.

All of that was ongoing and didn't necessarily need a big injection of additional funding, but now we see in this 2018 NPR a commitment to build up an infrastructure that could produce up to 80 new warheads a year, if necessary. And that strikes me as worth really focusing on as a separate issue from all the things that you were so, you know, rigorously and focused too in the past.

Do you see all that ambitious planning and spending as necessary, or would you perhaps either delay that or scale it back, or not do any of it altogether?

MS. CREEDON: So, I think this is exactly what you've just described, this is exactly what I think is a very subtle change in this NPR from the last NPR. There's a much more aggressive approach to the NNSA infrastructure, and the reason, the rationale for this more aggressive approach, isn't just to maintain the capability, to maintain our stockpile, through stockpile stewardship, but there is a subtle shift here.

The NPR talks about increasing test readiness. The new NPR talks about PETs, but it uses somewhat new language, it talks about at least PETs, and before the discussion was really 50 to 80. It talks about really pursuing the new statutorily mandated stockpile responsiveness program, in a very aggressive way, so that you're having the labs and the plants really do prototyping almost, doing design, maybe even doing a little metal bending.

So, you've got a lot of things that are being put in place that -- and also some of the discussions with respect to hedging, that really looks like it's laying the foundation for a much larger arsenal down the road. I mean, that's how I would interpret this. So, whether it becomes that or not, obviously is something that only the future knows, but it certainly seems to be building a more capable infrastructure.

MR. O'HANLON: So, larger arsenal, and perhaps also new kinds of

warheads someday, with this hedge language on testing, we are not going to do it now, but maybe someday we might reserve the right to return?

MS. CREEDON: Yes.

MR. O'HANLON: James, I know that, among the panel we just heard some concerns from Madelyn Creedon, and from Bob and Jim, but you may be the sharpest critic of any of us, or at least I'll invite you to be that if you wish. So, let me just address to you the very simple question of, you know, what do you find most concerning about the NPR, as well as anything you want to say that you applaud or support?

MR. ACTON: Let me first weigh into this debate about continuity versus change. Mike, I think the government reports are a bit like T-shirts. In the real world there are only so many changes you can make, right. Any T-shirt has to have two holes for your arms to come out, and one hole to put over your head. And in the same way there are limits to how much you can change a government report.

So, obviously there's element of continuity with previous NPRs. But I think within the range of NPRs that one could imagine the government of the United States conceivably producing, this one is much more change than continuity.

Let me identify four different areas. Firstly, it's the changes in declaratory policy that Bob I think has very ably outlined. And let me emphasize just one thing here, the United States is now threatening to use nuclear weapons in response to attacks that would almost certainly kill not a single human being.

I'm referring to attacks against space-based elements of the U.S. Nuclear Command and Control System. Those attacks could be extremely consequential; I'm not playing down their significance. I'm not playing down their significance; I think threatening to respond with nuclear weapons to those is dangerous and incredible.

Secondly, this document does not make any attempt to reassure Russia about the survivability of its nuclear forces. For decades the United States has been willing

to say, whatever incredibly serious political disagreements we have with Russia, including at the moment its annexation of territory from two sovereign states we accept -- you know, we are in a relationship of mutual deterrence with Russia, and we are not going to try to undermine Russia's nuclear arsenal. This document does not do that.

Thirdly, for practical intents and purposes, this document takes arms control off the table. It pays lip service to arms control, it doesn't completely exclude the possibility of doing it, but its lip service. There is no serious constructive arms control agenda laid out. And fourthly there's this issue of new capabilities.

We should quite rightly -- you know, the framers of this NPR, in my opinion, rightly have concerns about Russia, and about Russian first use. The issue here though, is I think our fundamental problem is not with Russia's willingness to use nuclear weapons first, we don't have a no-first-use declaratory policy, we reserve the right to use nuclear weapons first if we were losing a large-scale conventional war.

The problem we have with Russia is its combination of conventional superiority around the Baltics, coupled to threats of first use. It's those two things together. We are worried that Russia can overtake the Baltic States, because NATO is conventionally weak there, and then use nuclear threats to try to deter NATO from taking back NATO's territory.

I think we should worry about that. I think that's a real problem, but when you frame the problem in the way that I've just done, that the root cause of the problem is conventional weakness around the Baltics, for me the best solution to that is, let's become less conventionally weak around the Baltics.

I don't mean we should put hundreds of thousands of troops into the Baltics, and have a capability that could match Russia, but what the theory of conventional deterrence tells us, is conventional deterrence fails when the other side believes it can execute a rapid and bloodless *fait accompli*. Right now Russia is so conventionally superior

around the Baltics it could take those territory in a matter of just a few days with, you know, a minimum number of casualties.

That's a huge problem in my opinion. Having enough conventional force around the Baltics that Russia would sustain a bloody nose if it tried to take over the Baltics, that it would take two weeks of effort and tens or hundreds or thousands of casualties, rather than two days and hundreds of casualties, I think it would enhance our deterrence posture around the Baltic much, much more than two different types of new nuclear warheads.

Now, I don't want to go on for too long. I think there are, you know -- there are real additional dangers and costs associated with these new warheads. But the big idea I want to get across here, is the problem with addressing these security problems in a Nuclear Posture Review, is you inevitably end up looking for nuclear solutions to that.

To my mind there's a real security threat from Russia out there, and I don't play that down in any way. But I do think that our fundamental response to that is much more effective in the non-nuclear domain, than in the nuclear domain.

MR. O'HANLON: Outstanding! Here's what I'd like to do. In about 10 minutes we'll get to your questions. I'm going to offer a couple of thoughts putting on my old CVL hat, the job I held 25 years ago when Jim Miller was effectively my boss, back then, working with Les Aspin, as well as a number of other Members of Congress, and we did some studies on the future cost of nuclear forces in the aftermath of the Cold War.

I want to look at some of the budget numbers for the modernization strategy, and the work down the row one more time for anyone to offer any additional comments, either in regard to that, or in regard to what they've heard from each. We'll do all that fairly quickly and then get to you.

But let me offer the following. We saw in this document, and we've seen, I think, in other Trump administration statements over recent months, the constant reiteration of nuclear modernization as being the top priority, which was also the Obama administration's

view, and often the comments that you would hear from Obama administration officials.

I remember once we had Admiral Richardson, the CNO here, and I challenged him a little bit, in a friendly way, as to whether that was the right way to think about nuclear modernization. And he said absolutely it must be, because our submarines are getting old. The Ohio-class need to be replaced, that they're not going to be safe anymore.

And what I'd like to propose to you is that we look a little more critically at the overall price tag estimated at \$1.3 trillion dollars for the full modernization agenda, and I want to suggest we may need to prioritize. Right now there are five -- as I define them -- five big categories of nuclear modernization in Trump administration plans, mostly consistent with Obama administration plans.

There is the replacement of the SSBN force, the ballistic missile armed nuclear submarines, the Ohio-class becoming the Columbia-class. There is the B21 bomber, the Raider being built, and that, among all these capabilities has dual purpose, conventional as well as nuclear. There is the desire to replace the Minuteman ICBM force, even though it's been around for a long time already, there are some questions as to how much longer it could remain in effect.

There is the Nuclear Command and Control that Jim and others have talked about being seen as vulnerable to cyber attack, to nuclear attack, just getting old itself, and then finally the whole Department of Energy nuclear weapons infrastructure question.

I would like to put forth the very simple conceptual point. First of all, that I'm not persuaded by the math that I see in the NPR, it claims that this entire agenda will never lead to a higher percentage of the defense budget for nuclear modernization than about 6.5 percent. I think that's a very low estimate. When I do the math I come up with a number closer to 10 percent, and that doesn't even include Madelyn's domain of the nuclear weapons activities of the Department of Energy which are, when you add up cleanup and everything else, close to another 20 billion.

So, this is real money, and I think right now there's a little bit of a giddiness in Washington, the defense budget is more or less fully funded robustly across all domains, I don't think that's likely to be the case, so I think we need to start to prioritize, and at least have a debate about which of these five areas of modernization are most important.

To my mind there are three that are clearly more important than the other two, that's my own analytical judgment, others may disagree, on this panel or among all of you, or elsewhere in town, but I think clearly we do need to replace the nuclear-armed submarines. They're getting old, they are not going to be safe for our sailors that much longer. They are already pushing 40-year service lives, which is far and away the longest we ever operated a submarine in the United States.

So, I fully support, you can debate the numbers and the specific details, fully support replacing the Ohio-class with the Columbia-class.

MR. MILLER: Michael, if I may?

MR. O'HANLON: Please.

MR. MILLER: They are also the most survivable strategic system.

MR. O'HANLON: So, another --

MR. MILLER: They carry the bulk of our strategic warheads.

MR. O'HANLON: Right. Thank you. I also fully support the B-21 Raider because I see it as being so useful for conventional war fighting. It is one of our asymmetric advantages in conventional war fighting, long-range, stealth bomber. You'll recall we already have a stealth bomber, but we've only got 20 of them in the B-2 force, and any kind of large-scale deterrence of large-scale conventional conflict I think it's going to require substantially more long-range stealth than that.

So, for me the overwhelming argument for the B-21 is the dual capability of that platform, and I'm very glad to see that it's, at least at the moment, robustly being funded.

Finally, nuclear command and control, and with Jim Miller here, I could have

mentioned his affiliation with the Defense Science Board. A year ago the Defense Science Board put out a report that I still lose sleep over occasionally, because it talked about how we really couldn't vouch for the cyber resilience of any of our nuclear systems.

It didn't go so far as to say they are all vulnerable to being taken down tomorrow by hackers, but it said there are questions about basically all of them, that we are going to need a decade to remedy. And so to the extent that we can't vouch for the integrity of our nuclear command and control, that's got to be seen as a top-tier problem. The DOE, we've already heard a lot of questions and criticisms, or at least you know doubts about some of the more ambitious planning there.

And finally, on the ICBM force, I think we can probably delay it, the way that RAND, the way that GAO have examined, by finding a way to shrink it somewhat so that some of the existing deployed missiles become a repository of test missiles, because there's a certain number a test flights you have to do per year. If you do a combination of refurbishment of the Minuteman Force and a modest downsizing I think you can maybe buy another 5, 10, 15 years before you have to replace it.

In any event if resources get tight I think we need to have these kinds of options in mind. So, it might be nice to do all five, I'm not sure we are going to have the funding. That's my little sermonette for the day.

And so now, without further ado, and without any more questions from me, there's a lot on the table already, I'm just going to ask my colleagues up here to offer any further thoughts they'd like before we get into the discussion. And we'll just work down the row, starting with Madelyn.

MS. CREEDON: Well, the one thing you forgot, there's also the Joint Strike Fighter. So, the F-35 also has an important role in terms of being that dual-capable aircraft for delivery of the non-strategic warhead. So, again like the bomber, it has two very important missions both the -- you know, primarily dominated by the conventional side. But

again, it's part of this mix.

And as you mentioned -- well, and probably one more you forgot. At some point we are going to have to come back around, and do something with the D-5, which is the missile that's on the Columbia-class, and that will then transition -- or on the Ohio-class, and will transition to the Columbia-class. So, at some point it's going to have to go through a life extension.

And then, in addition to all of the physical infrastructure at NNSA, there's also the physical infrastructure at DoD, which is also not discussed very much in the NPR other than, I think there's a very quick mention of the modernization of the silos themselves for the Minutemen-3/ Minuteman-4.

And then the other large problem out there is, you also have a people infrastructure that really has to be paid attention to, as we transition from a period of time from the Cold War where there was testing of some of these warheads, to a period of time where we've gone from -- we've made the handoff for the most part from the folks who had testing experience, to the scientists and engineers now who are taking it forward, and the next big transition will be when they handoff to that next generation.

And to do that we also have to have a significant investment in long-term science and engineering for stockpile stewardship, and that's not very well laid out in the NPR as well.

And then finally, as we get rid of the 40 to 60 percent of these old buildings across both the DoD and the NNSA complex, we have to pay to get rid of them. And that's another big unpaid bill. So, I mean, I am in complete agreement with you that some of these rough estimates, the 1.3 trillion, all of this, are pretty low.

MR. O'HANLON: Thank you. Jim?

MR. MILLER: Michael, I agree with your concern about the cost associated with the nuclear program's writ large, at the same time I fundamentally agree with what

Secretary Mattis said, as David paraphrased at least, which is that we can afford survival. I'll put it differently, we can't afford not to invest in the national security that we absolutely need. No one else is going to take care of our nuclear deterrent for us. In fact, our nuclear deterrent forms the nuclear umbrella for our key allies and partners around the world.

So, to me if it's 7 percent, if it's 10 percent, that's an acceptable price. It doesn't mean that any nuclear program, let alone all of them should get a free ride. You probably remember that Secretary Gates, when he was Secretary, did a hard scrub, both of the Columbia-class SSBN, and of the B-21. At one time he canceled the program, it took us over a-year-and-a-half to come back with recommendations for a new program that was believed to be, and let's hope it is, more cost-effective. So both within programs and across programs we need to be asking those questions.

My own view is that although the Department has concluded so far that the most cost-effective way to go forward with an ICBM leg, is to modernize. That you're probably right, that if one takes down the overall size of the force a bit from the 400 deployed today to a somewhat smaller number, that one could buy time.

I'll save my own recommendation in that regard. It's not going to save a lot of money because I believe the most important role of the ICBM leg of the triad, is to hedge against any future problem with the submarine leg. Don't see it today, could see it 20, 30 years down the road. So, a hedge program that includes some research and development on potential mobile options for a future ICBM, to me, makes more sense than putting a whole bunch of hundreds more in silos in the near term.

MR. O'HANLON: Thank you. Bob?

MR. EINHORN: Having a sustainable deterrent requires a very broad domestic support. This NPR, the Trump NPR builds on what President Obama did. President Obama actually had a very robust modernization program, and the Trump administration follows that. Where the Trump administration departs, where it's less

continuity than change, in some areas that I think will raise questions about the ability to sustain that national consensus.

The idea of new nuclear systems, a declaratory policy that suggests that the U.S. is prepared to use nuclear weapons in a wider range and circumstances, I think these will create challenges for building that kind of national consensus.

And I think it's important that the administration do more to build that broad support, including as a number of panelists have suggested in the area of arms control in particular, there are easy things that could be done, simply agreeing to what the Russians have apparently proposed, which is a five-year extension of New START; I think, you know, Dave Trachtenberg talked about this earlier and the administration, you know, will have to try to keep this consensus together, but it will be a challenge with the current NPR.

MR. O'HANLON: Thank you. And finally, James?

MR. ACTON: So, as some of you may know, a pre-decisional draft of the Nuclear Posture Review leaked in The Huffington Post a few weeks ago, and you can compare the original draft to the published version. The single-most interesting change, in my opinion, was in the letter from Secretary Mattis at the beginning.

And in the draft it said that nuclear modernization was quote, "The top priority of the Department of Defense." And in the final version it is "A top priority of the Department of Defense." And you don't need to have served in government to understand -- which I haven't -- to understand that the difference between "the top priority" and "a top priority" is a very significant difference.

And the fact that this change was made in the letter from the Secretary of Defense himself, I don't know who made the change, but I would hazard a guess that it was the Secretary of Defense himself that made that change, given that it was in the one -- you know, the letter that was signed by him.

If I'm right about that, and I have no idea if I am or not, that suggests to me

that your assumption, you know, there will have to be trade-off made in the nuclear budget I think is exactly right. And if there are trade-offs made, then I totally agree with Mike about where those should be made.

Let me just say one thing about nuclear command and control, which is an area that I'm worried we are short-changing at the moment. For me, it's kind of balmy to be looking at a third and fourth low-yield nuclear option, and that's what the low-yield SLCM, and the sea-launched cruise missiles are, they would be the third and fourth low-yield options, when we acknowledge we have a vulnerable command and control system on which everything depends.

The fundamental challenge I think with command and control today is that so much of -- so many of the U.S. assets for command and control of dual-use, they use for both conventional and nuclear missions. The advanced, extremely high-frequency satellites, communication satellites would be used to transmit execution orders to nuclear forces, they are used by special operators, they are used by ground forces, they are used by naval forces.

So, you know, the other side may have an attack to -- an incentive to attack those in a war, to undermine our conventional war-fighting ability, and that could have -- that would have huge implications for our command and control system.

As an analyst at a think tank, I can come up with ideas for rectifying this problem cheaply. And as it's very well known, every time analysts and think tanks come up with cheap ideas they always work out that way when they are implemented in practice. There's never you know -- it's so easy to implement these ideas in practice.

My sense is, in the current security environment particularly in the face of developments, and anti-satellite weapons, and cyber weapons, actually building a resilient and redundant command and control system has the potential to be an extraordinarily expensive prospect. To my mind, that is the single biggest priority we as a nation face when it comes to nuclear forces at the moment.

MR. O'HANLON: Thank you. Okay. We'll go to all of you. Please wait for a microphone and identify yourself. I'll take about three questions at a time, if I could. We'll start here in the third row and then work our way a little bit backwards.

QUESTIONER: My name is Al Scott, and I'm with the Transatlantic Center at the moment. No one mentioned disarmament. So, non-nuclear weapon states would argue that the Non-Proliferation Treaty has at least two legs, and one is non-proliferation and the other one is disarmament, enshrined in Article VI, of the NPT. The NPR explicitly rejects disarmament in the context of the Ban Treaty, so a lot of (inaudible) use for the disarmament and the NPR, and the Non-Proliferation Treaty.

MR. O'HANLON: Thank you. Let's see who is -- we'll go to the woman in the red shirt, and then we'll come over here for the gentlemen on the far aisle, and then back to the panel.

MS. BURKE: Susan Burke, formerly with the State Department. This is a question about low-yield. As someone who is a veteran of multilateral non-proliferation negotiations, I think notwithstanding this excellent discussion, this is going to be a really hard sell to the international community. But there seems to be a real focus on low-yield, as if that's somehow better, and I just would like some sort of comment on that.

I've seen, you know, low-yield as a Hiroshima type bomb. You know, do we know what we are talking about there? Is this somehow better? And I think that is the discussion that's going on, on social media and so forth, is what exactly is meant?

MR. O'HANLON: Great! Thank you. And then over here, please.

QUESTIONER: Thank you very much. My name is Rafael from the Brazilian Embassy. We have heard a lot on the rationale for the NPR regarding other nuclear powers, or American allies. But I would like to hear, please, some comments on the impact of the NPR on other countries, and on the future of the non-proliferation regime. Since we understand that the nuclear power countries are redoubling their bet on their nuclear arsenal,

what is this message conveying to other countries?

And lastly, regarding this TBT, it's explicit in the NPR that the United States will not pursue its ratification. What do you think would be the future of this structure that we have from rather 20 years, and is not enforced? Thank you very much.

MR. O'HANLON: Great! So, we've got a couple of questions on sort of warhead-related issues, and then a couple of questions on broader disarmament strategy. Maybe I'll ask Madelyn to begin on whichever questions you wish, and each person can then comment on one or two.

MS. CREEDON: Let me talk a little bit about sort of the CTBT, and how it relates I think to the NPT and our commitment Article VI. So, the one good thing about this new NPR is that it does commit to continuing the moratorium which is good. I don't think it was a surprise that there's no interest in seeking CTBT ratification from this administration, but to me the thing that was most important, and which had been swirling for a while, is there is a stated commitment to the CTBTO, and also to the international monitoring system.

That is hugely important in terms of making sure that the foundational abilities to monitor -- and to monitor testing will remain in place, and will continue to grow, there's also a comment in there about support to the IEA as well. So, that at least I think in many respects tempers what isn't -- what is, frankly, something that was expected in terms of not seeking ratification of the CTBT.

The two other big issues on Article VI really get back to the change in emphasis on this NPR, and the lack of significant focus on further reductions, or really working to achieve zero and, you know, with more emphasis on securing nuclear materials and making sure others don't continue with any terrorists or other development of nuclear weapons. So yeah, I am concerned about this, but I think from a U.S. perspective, the most important thing we could do is get that five-year extension to the New START Treaty.

MR. O'HANLON: Secretary Miller?

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MR. MILLER: Good! Let me start by strongly agreeing with Madelyn about the importance of extending the New START Treaty, and that that should be an easy, straightforward decision for the Trump administration, and should be a priority. The United States has benefited not only from the reductions that we would have in Russian strategic forces without a treaty, but from the data exchanges that occur on a constant, or an ongoing basis every year, and on the 18 annual inspections that were able to undertake, significantly reduces the prospects for worst-case planning, and really on both military sides.

On the question of disarmament; and it's worth noting that this NPR does say that the administration continues the long-term goal of a world without nuclear weapons. What it says is that that goal looks further away not closer than it did.

I took it as a positive that it still included that goal, and that what does concern me, and Bob Einhorn articulated it as well, is the subtle appearance of the expansion of the role of nuclear weapons in U.S. nuclear policy, or U.S. strategy. It's below the top line, it's not the fundamental points of declaratory policy, but it does appear that there are elements of an expansion in attempting to deter additional attacks relative to what certainly the 2010 Nuclear Posture Review believed, or asserted.

That's important, but the bigger deal again to me, is not the difference between the 2018 Nuclear Posture Review and the 2010 Nuclear Posture Review, it's whether the 2018 Nuclear Posture Review reflects the view of the President of the United States, who has sole authority to direct the employment of nuclear weapons.

On the question of yields, of the low-yield SLBM warhead in particular, Susan, there's no question in my mind that it's going to end up being much larger than the largest U.S. conventional weapon. So, the U.S. is modernizing the so-called Massive Ordnance Penetrator, the MOP, a 30,000-pound weapon.

We are talking about, I would guess, at the lower yields that they would contemplate something that is hundreds of times more -- has more explosive potential than

the largest conventional weapon that we have. And if that is the case I certainly don't see that it reduces the nuclear threshold, it may be a more credible response to nuclear use, and to the extent that this Nuclear Posture Review focuses on that role of nuclear weapons the fundamental purpose of nuclear weapons to deter nuclear use by others, I think it goes in the right direction, to the extent that it in any way expands that role relative to where it is, or where it has been in the past, I think it goes in the wrong direction.

MR. O'HANLON: Thanks. Bob?

MR. EINHORN: There was a question about the international response to the NPR. I think it'll be mixed, I think. Many U.S. allies and partners around the world will like the NPR. The idea of enhancing extended deterrence, you know, countering possible Russian interest in initiating the use of -- the limited use of nuclear weapons, I think our Baltic allies, Eastern European allies, and our North East Asian allies will find a lot to like in this NPR.

Japan is an interesting case, just Japan is the only country that's been the victim of nuclear attack, and has been a strong proponent of nuclear disarmament, but the day after the NPR was issued, the Japanese Foreign Minister came out with a very strong statement of support for the NPR. The Japanese relied heavily, and in their view relied heavily on the nuclear Tomahawk, the nuclear sea-launched cruise missile, and were upset when it was retired. I think they'll be very happy with the resurrection of this capability.

I think the South Koreans also will see a lot to like. Many other non-nuclear weapon states, non-aligned non-nuclear weapon states, won't be happy with it. They'll be at least relieved that the administration retained the negative security assurance, the assurance that the U.S. will not use nuclear weapons against non-nuclear weapon states party to the NPT in compliance with their non-proliferation obligations.

They'll be relieved by that, but I think they'll be concerned about the implication that the U.S. may be increasing the role of nuclear weapons in its strategy. The

non-aligned have been unhappy with the slow pace of disarmament, nothing in this NPR will change that, but I don't think it will qualitatively change that. That it may give stronger support for the nuclear-ban movement, but I don't think it's going to fundamentally affect the prospects for proliferation.

I think, you know, countries don't pursue nuclear weapons because they don't believe that having them is essential to their national security. I don't think this is going to change that very much.

MR. O'HANLON: James?

MR. ACTON: Thanks, Mike. Let me tackle both the questions that brought disarmament into the fray. As the questioner correctly pointed out, the document, the NPR does reject the Ban Treaty as did the Obama administration before that, and any US administration would have done. It doesn't avert -- it doesn't endorse the long-term goal of a world without nuclear weapons. I think that was not a foregone conclusion that that statement would be in this NPR.

Nonetheless, there's clearly a big difference and emphasis between the Trump administration's position on disarmament, and its predecessors. Now, now the logic of the Obama administration, and let me say this with some modesty, because the three people sitting to my right were deeply involved in crafting the logic of the Obama administration, and I wasn't. But you know when President Obama in Prague gave -- you know, renewed the U.S. commitment to a world without nuclear weapons, my interpretation of what that strategy was is building upon the argument made by many non-nuclear weapon states, that if you want us to do more on non-proliferation you guys, the weapons states, have to do more on disarmament.

And the effort was a very kind of hard-nosed security-driven logic that by doing more on the Obama administration -- by doing more on disarmament the Obama administration was trying to catalyze a coalition to work on non-proliferation.

It wasn't as is sometimes claimed that the Obama administration thought that if the U.S. gave up nuclear weapons North Korea would do so as well, it was that the practical tools we need to deal with non-proliferation, the more widespread adoption of enhanced IEA safeguards.

The more rigorous enforcement of export controls, of sanctioning countries that break the rules. Doing that required a political *quid pro quo* between disarmament and non-proliferation.

Let me say two things about implementing that strategy in practice. The first one is the efforts to abolish nuclear weapons can be led by the U.S., but it can't be done by the U.S. solely. The Obama administration was absolutely willing to continue negotiations with further reductions with Russia. The Russians had no interest in doing so. China won't even enter into a serious dialogue with the U.S. about nuclear weapons and further reductions.

Are there barriers to disarmament here in the U.S.? Absolutely! Are there also barriers in other countries that sometimes get ignored when criticism gets heaped on the U.S.? Yes.

And secondly, I was really disappointed by the reception amongst many non-nuclear weapon states to the Prague Speech. Not one single Head of State, somebody of an equivalent stature of Obama, stood up and welcomed that speech, and pledged to work with him. Not one; standing up alone, as opposed to in the Security Council.

So, you know, it's not my job to tell non-nuclear weapon states how they would respond to the NPR, I think that I would love to hear more from non-nuclear weapon states about their response to the NPR. All I would say is, you know, if in a future administration you want the U.S. to take disarmament more seriously, I think the more that there is public support for efforts made by a U.S. President on disarmament, and let's not forget how politically brave the Prague Speech was, the more that that kind of effort is

endorsed and welcomed by other states, the more chance there is to make it sustainable.

MR. O'HANLON: We'll do one more round here in just a second. First, I have two clarifying points, or additional points. One, I think you've heard us reference the Prague Speech, of course for those of you who may have forgotten this was President Obama's April 2009 Speech, early in his presidency, really articulating the vision of a nuclear-free world at a time when it still seemed conceivable that we could make near-term progress.

Towards that, Obama didn't have any utopian view that this could happen fast, I think he questioned in the speech whether it could even happen in his lifetime, but it seemed a more thinkable kind of concept back then, and that's why you've heard some people refer back to it. Just for those of you who may not follow this stuff quite as much as some of us do.

And then secondly, my own personal speculation on the low-yield warhead, without having been read in to have the kind of security clearances on this subject that would enable me to know the real answer, and not be able to say it. So I'll give, potentially, a wrong answer but I will say it. And this is based on a lot of what's come out over the years from what we know about nuclear weapons design, writings by people like Frank von Hippel and Richard Garwin that I've tried to devour over my career.

And I think the simplest way we can understand this. You know that modern American nuclear weapons are essentially two-stage, they're thermonuclear hydrogen bombs. What that means is a first nuclear detonation, sort of in spirit like a Hiroshima or Nagasaki bomb goes off that creates the necessary temperature and pressure to then ignite the hydrogen fuel in the secondary.

So, you need a small nuclear burst to make a big one. The simplest way to take one of those weapons and turn it from a big-yield weapon into a small yield weapon is to get rid of the secondary, or to contaminate the hydrogen fuel with something that's not going to ignite as much, and not produce as much yield. And what I don't know, I don't claim to

even be able to speculate about, is just how much you can dial down the yield of that secondary, sort of, as you wish, without particular, new design or testing.

But I do think it's fairly predictable that you could simply eliminate the secondary or render it inert in one way or another, and therefore you could wind up with yields that are probably somewhat smaller, and Jim was hinting at this with the way he talked about scaling up from the MOA by a factor of a hundred or hundreds, probably in the 1 kiloton range, is what you could fairly, confidently produce as a readily-available weapon out of this kind of approach.

That's just my, hopefully, informed speculation, not based on classified information, not speaking for anybody else on the panel, or the NPR.

By the way, one last thing, I'm going make a personal note to thank Steve Pifer. Steve Pifer, he's in the audience today, he's been a person here at Brookings who has written a lot on nuclear weapons issues over the years. He will continue to do, so but from a sunnier perch in California where we thought he might already be today, which is part of why he's not up on the panel.

But when we get to the end, I'm going to ask you to not only thank the panelists, but thank Steve. But we'll hold off on that until after the last round. So, yes sir, in the back with the --

MR. PRYCE: Thanks. I'm Jeff Pryce, at Johns Hopkins SAIS. First on the lower-yield Trident, I think Bob Silver was quoted in *Defense News* as talking about primary only. So, that's unclassified. And my question goes to the crisis stability implications of effectively using a strategic delivery system for a non-strategic warhead, or mission.

There's a lot of ways to deliver a lower-yield warhead in a regional crisis, and some of the questions that arise with the Trident in particular is, this is in some way using your end-game capability, your secure second-strike capability at the beginning of a limited nuclear confrontation. And there are certain questions that I think the discussion needs to be

had about whether that's -- you know, the wisdom of that, and the implications of that in a crisis which is by definition, a nuclear crisis?

MR. O'HANLON: Thank you. I'll see if we can take one or two more. The woman in the very back of the room in the aqua shirt, please?

MS. DRESSMAN: Hello. My name is Alicia Dressman. I'm a Nuclear Policy Specialist. I have a quick question for Madelyn Creedon, and then a question for Jim Miller. Madelyn Creedon, do you see in the future, an interoperable warhead, LEP, that would require modification of the physics package knowing that right now they're focusing on the non-nuclear components?

For Jim Miller, you mentioned road-mobile ICBMs as the future alternative. Obviously in the recent Air Force AOA, they canceled that option. Could you give -- could you gauge qualitatively, the hunger for a road-mobile option? Knowing of course that Russia just slashed that because they're broke, as usual? Thank you.

MR. O'HANLON: I'll take one more before we finish up here with the panelists. So, I'll go here to the fourth row, please?

MS. SIMPSON: Erin Simpson. And a question for Jim, or others on the panel who would want to answer. You put forward a reduction in the overall size of the ICBM force, and I'm wondering if you envision that as part of long-term arms control, or you would do that unilaterally?

MR. O'HANLON: So, in this round which will be our, also our concluding statements. Why don't we begin with James, and we'll give Jim the very last word, since a couple of the questions were for him. So, we'll go: James, Bob, Madelyn, and then Jim Miller.

MR. ACTON: Thanks. Let me just say a couple of -- talk briefly about the low-yield SLBM option, which as I've already said, like I think I'd much rather spend the money on bolstering the conventional deterrence around the Baltics, but there's two real operational issues I see with using a low-yield SLBM. The first one is you risk giving away

the position of the submarine that the missile has fired from.

Russia is rebuilding its constellation of early-warning satellites, those would detect a missile very shortly after launch, which would mean that Russia would know where the U.S. Trident was fired from, which would presumably be a significant aid to Russia in hunting down U.S. SSBNs.

Now, if we are actually in a conflict where nuclear weapons are being used, it's not just a nuclear crisis -- we are actually in a nuclear war by that point -- I would think that keeping our most survivable forces survivable, would be an incredibly high priority for U.S. decision-makers. So, I actually think that if we were really in a nuclear war the use of this option would not be an attractive one for the decision-makers because, you know, there's so much -- such a high percentage of the really survivable warheads are on SSBNs.

The second issue is the so-called discrimination problem, which is, Russia could not distinguish between the launch of a low-yield Trident and a normal Trident. Does that increase the chance that Russia would respond with a high-yield nuclear weapon before -- or multiple high-yield nuclear weapons, even worse, before our Trident exploded and Russia knew it was low-yield, if indeed it does to have the capabilities to determine yield rapidly after detonation.

Now, this is a very complicated issue, which I'm not going to go into huge amount here, because time is short. All I would say is there was a proposal, about ten years ago, called conventional Trident modification. I know one person on this panel, in particular, probably still has multiple scars from that experience. All I would say is, and that was the idea that you would take some nuclear warheads off Trident D-5 and replace them with conventional warheads.

Congress decided not to fund that capability because of the discrimination problem, and that was not even a capability that anyone was talking about firing at Russia. This was a -- the issue there, was using this against Iran, North Korea, maybe China, no one

was arguing for using it against Russia. But the discrimination problem was deemed so severe, even though we wouldn't be firing this at Russia, that Congress didn't provide money for it.

I think, now we are talking about a low-yield capability, specifically for the use against Russia so I think we have to take this discrimination problem seriously even if, you know, the question of: Would Russia respond with multiple high-yield warheads as soon as it detected the launch of one of our tridents? That's a complex question to answer, and one I'm not going to try to do in five seconds.

MR. O'HANLON: Thank you. Bob?

MR. EINHORN: I'm going to give my time to Jim, because I want to hear his answers to James' questions about discrimination, and about exposing the location of U.S. SSBNs.

MR. O'HANLON: Great! Madelyn, before we hear from Jim.

MS. CREEDON: So, I just want to --

MR. MILLER: Thanks a bunch.

MS. CREEDON: I just want to emphasize everything that James has said. I mean as hard as it would be to quantify W76-1, to have a low-yield option may be a primary yield only, the operational considerations are going to be much, much harder, and James has only touched on them. So, that is a huge issue with respect to employment, and I'll just sort of add out there that, I mean, right now our D5 missiles all have multiple warheads.

So, when you think about this, are you going to have multiple low-yield warheads on a single D5? Are you going to mix them with other high-yield warheads, and other -- you know the operational issues associated with this are extensive and extraordinarily complex, more so than the complexity of the warhead itself.

So, let me go to the I-W, one of the interesting things about this NPR is I'm not sure there is any discussion of the Obama 3+2 strategy. There is a small discussion of

interoperable warheads but it has kicked it out for the future because under the Obama 3+2 strategy, sort of, the next life extension up for ballistic missiles was going to be the IW-1.

And it was ostensibly going to be a warhead that could be used on an ICBM and an SLBM, and it would look like something that we replaced the Air Force W78, and also the Navy's 88. The 88 has now gone -- the W-88, which is the warhead for the Navy, is going through, sort of a rehab. It's not a real life extension but it's sort of less than that, they called an alteration, but it's -- think of it as a rehab. But it has extended the life.

So, as a result of that the language in this NPR really talks about doing a life extension on the W78. So, in my mind that means that we may have walked away from the initial 3+2 strategy, and will retain four for a while rather than going to three.

Now, one of the interesting things that I would sort of throw out there for general discussion is, maybe if there is real seriousness about thinking on low yields, maybe something that could be explored would be an IW down the road that would have variable yields.

You know, so that you're not giving up, if you will, a strategic delivery platform, but maybe you look at something that looks like an IW, with variable yields for both the SLs and the ICBMs. Again, way out there, way long term, but I do think that this NPR walks away from the IWs, for the interoperable warheads in any near-term thing, and has probably walked away from the 3+2 strategy.

MR. O'HANLON: So, Jim, we'll finish where we started, over to you.

MR. MILLER: Thank you, Michael. Alicia, I have not seen a great clamor in the land for a road-mobile ICBM, and indeed I'm not arguing for that approach. What I do believe is that, if you believe that the single-most important role of the ICBM leg, in a world where we have large numbers of weapons on the SLBM leg, our strategic submarine leg, then the most important role of the ICBM leg is to serve as a hedge against any problem with the survivability of that sea-based leg.

If that happens 20 years, 30 years down the road, and I would not expect it to have any real prospect of happening any earlier than that, but it could in that timeframe, then the answer of deploying more silo-based ICBMs, or putting more warheads on those ICBMs, would not serve strategic stability.

So, because of that, I think that a better program, even today, would be to go to a light rather than a heavier ICBM. The Minuteman replacement, it looks like it'll be about the same 78,000-pound missile as in Minuteman-III. The old, small ICBM was roughly half that weight, which gives it less throw weight, if you will, less capacity, but sufficient to have a single warhead plus decoys, and a more attractive candidate for going to road-mobile.

And to answer also Erin's question on this topic; my recommendation, which also has not been met with, you know, great clamor in the land, including from the Defense Department, would be to go unilaterally to a lighter ICBM, to deploy perhaps a couple hundred in silos to have them as necessary and when necessary to retain an ICBM leg, and then to have a research and development program, and a demonstration program for a road-mobile.

My guess is that that would cost about the same as going forward with 400 ICBMs and silos over a period of years. The cost would be somewhat later which is useful, but most importantly it would provide a hedge that we, otherwise, will not have. And it would be a realizing hedge in the event that SSBNs or strategic submarines became vulnerable 20, 30 years more down the line.

On the question of crisis stability that Jeff asked. It's a good question. My view is that a low-yield warhead on a Trident -- on a D5 missile is (a) a nuclear warhead, and (b) a strategic warhead, and that one should not imagine that because something is lower-yield, that it's going to be -- that that will be known immediately by Russia or by anyone else. Nor that it means it's not a strategic asset.

So, they will be significant, and would be, I believe, significant hurdles, even

above the hurdles that we should rightly have in employment of any nuclear weapon, because it's a strategic system, and I think for the -- my guess is, it's for that reason that the administration decided it would also go forward as a longer-ranged program to have a sea-launched cruise missile with -- that's again nuclear-tipped.

And let me just say that from my perspective, as a person involved in the Obama Nuclear Posture Review, the reason for eliminating the TLAM/N, the sea-launched cruise missile nuclear tipped at that time, was not that it was either destabilizing or inappropriate to have, is that it was at, if not past its end of life.

And the question was, at that point in time, 8 to 10 years ago was it -- should it be a priority investment of the United States Nuclear Posture to reinstate that capability, or were there far more important things?

At that point in time that the judgment of the President, and a unanimous recommendation from the Joint Chiefs, was required as well, was that that system was not necessary, and did not fill -- was not needed to fill a gap in the extended deterrence in particular.

I do think that that calculation has changed with respect to North Korea, and with respect to Russia, and at the same time it's a 10-year program, so Secretary Mattis has said, it also provides an opportunity for the United States have a development program that could be part of negotiations going forward, with Russia. To (a) stay within INF, and (b) to put its tactical nuclear weapons on the table for serious negotiations, something that the Obama administration attempted, and the Russians did not agree to pursue.

I still believe that that would be a valuable next step, and the United States should continue to pursue the extension of New START, and to pursue negotiations of the tactical nuclear weapons.

MR. O'HANLON: Fantastic! Thanks to you all for being here. Please join me in thanking Steve Pifer, and the panelists. (Applause)

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