2019 Nuclear Weapons Modernization Seminar
MITRE Corporation & GW School of Media and Public Affairs

Session 2: Weapons and Labs Panel

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Panelist 1: Dr. Charles P. Verdon, Deputy Administrator, Defense Programs, National Nuclear Security Administration
Panelist 2: Steve Girrens, Associate Labs Director, Nuclear Deterrence and Chief Engineer for Nuclear Weapons, Sandia National Laboratories
Panelist 3: Bob Webster, Deputy Director, Weapons, Los Alamos National Laboratory
Panelist 4: Kim Budil, Principal Associate Director, Weapons and Complex Integration, Lawrence Livermore National Laboratory
Panelist 5: Aaron Miles, Principal Assistant Director, National Security and International Affairs, White House Office of Science and Technology Policy

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David Ensor: I'm David Ensor. I'm the Director of the Project for Media and National Security at the George Washington University School of Media and Public Affairs. It's an honor to be here and working with the MITRE corporation today on this important conversation.

I remember being an undergrad at the University of California Berkeley and I did a lot of biking. I used to bike up in the hills, and I bypassed the Livermore facility up there every day and wondered what was going on behind those gates. I'm hoping to learn a little bit more about that along with the rest of you here today.

We have this next panel leaders from all of the labs and NNSA. We're going to talk about the labs and the science. We heard that sense of urgency in the first panel of military leadership about getting this done. These are the folks who have probably got the biggest and most complex task of all in terms of making that the case.

We've only got 45 minutes and some of them are already gone so it's going to slip a little, but I do want to try and bet as close as I can to the schedule. So I'm going to ask Dr. Verdon of NNSA, the Deputy Administrator, Defense Programs, for the National Nuclear Security Administration to give us just about a five minute look at the issues from where he sits, the challenges. Then we're going to turn to -- this is kind of like a TV show. I used to do these. I was an ABC News and CNN National Security Correspondent for 30 years. So it's going to be more of a conversation. I'm asking people not to read their prepared remarks, but really to make short answers. Terse. But of course as warranted.

So Doctor, can you come up here and just give us maybe five minutes on how it looks from where you sit.

Dr. Charles P. Verdon: Thank you and good morning. On behalf of my esteemed colleagues, thank you for inviting us to be here today to talk about this very important topic.

Just by way of introduction, you've heard from our comrades in the services. The National Nuclear Security Administration has the mission of delivering the warheads and the capabilities necessary to maintain confidence in the nuclear stockpile to ensure that they remain safe, secure and effective as you heard. And it also has the responsibility for ensuring that we have the enterprise, the facilities, the capabilities, and ultimately and most important the workforce to support that stockpile and deterrence for the long term.

I'll tell you quickly, you heard it from the first panel. We too have gotten the message and understand that there is urgency. Many people talk about the rheostat's move all the way over to one side or we're out of runway. We agree with that too. I'll go through a little bit of that.

In terms of the modernization that we have to do both in terms of the warheads and our infrastructure, we are running out of

time. If we don't make key decisions soon, there will be impacts on the effects in the long term of the deterrence, so we have to get on with that.

Before introducing some of that, let me just give you a quick state of kind of our complex right now. As you heard this morning and I'll reiterate, one of our roles is to ensure confidence in the safety, security and effectiveness of our warheads, and we recently finished that assessment for this year, and they do remain as stated. So they are effective, they are safe, they are secure.

We are undertaking several warhead modernization activities to meet the deterrent requirements. You heard some of those again from our colleagues this morning. And importantly, while we're continuing to produce warheads needed we are also working on modernizing our infrastructure. So in essence as we're driving the car, we're changing the tires and the engines and parts of the car as we're going down the road at the same time. As was mentioned, it presents a challenge but as we like to say it's one of the prides that we like to bring to this complex is the labs, the NNSA organization has risen to the challenges in the past, continue to do so, and we look at it as an opportunity to actually bring [iterations] to solve that problem.

As a way of illustrating it I'll tell you that, just some numbers. Fifty percent of our infrastructure is over 40 years old. Many of our critical facilities actually date back to the Manhattan Project. I'm actually utilizing buildings that were built in the late '40s. Some of them are some of our most key facilities that we have right now. So when people come in and ask us to put modern earthquake standards in a building that was built in 1945 or 1947 is a daunting challenge and you have to say is it more effective to replace it or to keep trying to fix something that was built back then?

All of this has to be done in a timely manner, or as they way, we risk the long-term effectiveness of the deterrent.

So some specifics you heard from Admiral Wolfe. NNSA did deliver the W76 Life Extension Program. This was the result of almost a two-decade-long activity and was successfully completed.

We're currently working on [oral] warning modernization activities, D61-12 Life Extension Program, D88 modernization program, BAE-4 Life Extension Program and the 871 modification program.

In terms of our production infrastructure modernization, NNSA has in place a program to renew critical manufacturing of our capabilities and facilities to ensure that we both have the material necessary to support warhead delivery, and also to ensure workforce safety. Those are two key objectives that we always look at when we identify what facilities need to be modernized first.

It's also important to recognize that NNSA is essentially its own industrial base. If you think about it, what we do and what we make, that's probably a good thing. But just remember that we don't have, in some areas we can reach out to the broader United States community to get parts and pieces, but for many of the things that we do, we are our own industrial base and that's key to recall.

So we have major modernization efforts including reestablishing plutonium pit production, work at the Y-12 National Security Complex to modernize our capabilities associated with uranium and lithium production. Additional manufacturing capabilities for non-nuclear components at the Kansas City location and at Sandia National Laboratory. And also, again, to address buildings that are more than 50 years old, buildings that are associated with our tritium production and delivery to the military.

Besides the modernization tools for the production, we also are

working to continue to enhance our capabilities in scientific tools needed to underpin the certification of the stockpile. In particular we are working closely with the Office of Science to ensure that we get delivery of an exoscale computing capability in the 2023 timeframe to support the certification of the W-87-1 modernization activity. That was a gap we identified that we needed to fill and we're working to fill it.

The other is we're also improving the experimental capabilities for important areas that we've identified as gaps. In particularly we're enhancing our capability to conduct what we refer to as sub-critical experiments at the Nevada National Security site. These are experiments that use high explosive and plutonium, but importantly, they always remain sub-critical. And what I mean by sub-critical is that they do not produce a growing fission chain reaction and therefore do not explode due to nuclear energy produced in the experiments. So we still adhere to the United States policy of zero yield in any of our experiments that we do.

In conclusion, I think NNSA, we've established a vision, a strategy, and more importantly we have set up an execution plan for delivering the warheads that DoD requires while improving the infrastructure that's needed to do it and develop a more responsive and resilient enterprise.

I think as was heard before, our working relationship in coordination with DoD is critical. I think it's never been better. We've been working very hard to make sure that we stay synchronized. You heard that quite a bit, how tightly coordinated this whole activity has to be in order to be successful.

And again, our stockpile remains safe and secure but we are running out of the runway. We have to address the capability gaps and the facility aging issues in a timely manner.

In order to recall at a timely matter, some of these facilities

that we have to replace from the day I say go to the day I can take actually productive programmatic use for them could be in excess of a decade, so it's not like I can go turn them on that day. That's why you have to do this. What we have now is an existing facility that can be very difficult to bring back on-line quickly. Those are the things that we have to try to balance as we're going forward.

So there's no question, we have challenges, or I like to call them opportunities. I have high confidence that provided the resource that the NNSA organization can and will execute the mission to get the job done.

With that I'll sit down.

Mr. Ensor: I'm not going to go with long introductions because I want to keep moving. But Kim Budil is from Lawrence Livermore. Next over is Bob Webster from Los Alamos. Steve Girrens from Sandia. And last, but not least, Aaron Miles from the White House Office of Science and Technology Policy but also with a background in the labs.

Let me start, Dr. Verdon, by asking you, you said you're in Washington and your task is to oversee all this but also to get the money out of Congress. How confident -- and this is a big project. The Congressional Budget Office estimates it could cost $400 billion to replace and update all the weapons including the plutonium pits, and that it might be, if you're looking at a 30-year budget it could be $1.2 trillion. A tremendous amount of taxpayers' money. How confident are you that Congress will put that much money into the project? How are you going to convince them that it can be reliably done and without underground testing?

Dr. Verdon: Good questions. I think confidence, all I can try to do is do my best working with my colleagues here as well as very importantly the services that you just saw up here today to show them that the weapon systems that they're developing,

they're not a full weapon system without the warhead that goes on them. So we have to work together. So it's really been a very tight, joint coordination in informing Congress and talking to Congress about the need for the modernization of both the delivery systems and the warheads that are in pre-production and support the warheads. So all I can say is we're doing the best, we're always learning how to try to tell that information to the leadership. But ultimately it's for them to decide. But all I can say is, I think, as I said, I've never seen the two organizations working as tightly together to try to make sure that they at least hear the story in a consistent manner.

Mr. Ensor: Aaron Miles, you're here in DC too. Talk just for a few minutes on the role of science. How do we make sure that we are never surprised by our adversaries? How do we stay ahead of the competition in this area?

Aaron Miles: I appreciate the question. You ask, when you think about the [inaudible] based, and they hinge upon the weapons complex. The same ones you heard this morning which are aging infrastructure and systems, and the others that were identified. That question really gets to the [inaudible] question. The fact that it's a time of rapid technological change. It's a time where we need to be prepared to face challenges, some of which we may be able to anticipate now, and some of which we can't. So the approach that is kind of written into U.S. deterrence strategy is to say that we need to have forces that provide, as we heard the triad say today, a set of key attributes that are suitable to deterring across a range of adversaries and circumstances.

So how do we do that? One thing the Nuclear Posture Review did is elevate hedging against uncertainty to [inaudible] nuclear weapons in U.S. security strategy along with deterrence.

So we formulated then a hedging strategy really in terms of sustaining those key attributes like the ability to survive an attack, to penetrate an adversary's defenses, to respond rapidly

if possible. Things that ensure that we can respond to nuclear attack, and also actually that help to convince adversaries that they can't discount the U.S. will to respond.

In order to sustain that set of attributes, we have to rely on really a scientific and technological approach that looks out and scans the horizon, that tries to build flexibility into the system platform and recognize that we look at, we heard [body] cycles for weapon systems this morning. They're really incredible. They're decades long. It's very difficult to predict a threat environment decades from now, so we have to be able to build a level and create a responsiveness into the systems themselves that we field but also the capability to adjust and modify them if necessary.

That gets to the workforce that was brought up. We need to have a workforce that understands both the things that we have in stock today, the challenges that we recognize today, and is also prepared to respond in a timely manner to the things that come up, to use the scientific and technological tools to provide information that will resolve technical challenges and also inform decisions that the policymakers have to grapple with and advocate.

Mr. Ensor: For Lawrence Livermore. Are [inaudible] around the planet?

Kim Budil: Yes, that's correct.

Mr. Ensor: And I gather that allows you to simulate important aspects of nuclear processes and [inaudible] without actually testing a bomb. How crucial is that technology to the ability to go forward with this plan? And are there other technologies which you or the other labs in your view ought to have in order to be able to execute this plan in an expeditious way? Folks have made clear that's essential.

Ms. Budil: Thank you for the question. I think this is

critically important and really to your prior question as well. The core [inaudible] fusion has been a problem of establishing a set of scientific and technical capabilities that allow us to assess the different regimes that a nuclear weapon traverses as it operates, and to build a really fundamental scientific understanding of the operations so that we can use modeling and simulation, [inaudible] modeling and simulation instead of tests to bring together all the understanding and assure ourselves that the stockpile remains safe, secure and effective. So it's sort of three or four sets of major large-scale facilities that we've developed that really form that process.

Major modeling and simulation and high performance computing capabilities. New capabilities for material science both on a small scale and a large scale. Dr. Verdon mentioned it's [a critical] experiment that's [inaudible] with that. And then hire [inaudible] facilities which allow us to go look at survivability and radiation environments, but also in critical thermonuclear burn that we care about for nuclear weapons science.

So today at Lawrence Livermore we have an actual mission facility, which as you said is the world's largest [inaudible] in the world, and we use that facility across a wide range of scientific questions to try to understand and develop new models for the physics of material at the highest temperature capacities. Similar conditions you might find at the center of the sun or the center of giant planets.

So [inaudible] currently where we use the national mission facility to inform decisions we're making about stockpile modernization. There are certain materials that we used historically which are either difficult to produce or environmentally challenging to work with. And we use the national missile facility's tasked alternate materials under relevant conditions so that we can make smart replacements in an effort to make them more sustainable in the future but also more manufacturable, and to build a system that's more cost-effective

going into the future.

The other thing that it does pretty uniquely is it allows us to give our scientists really challenging, complex multi-physics integrated problems where they can practice the art of design. They can build a complex experiment and then they can go out and see what mother nature has to say about their design.

As we bring a new workforce on board this ability to test, train, challenge those people in meaningful ways is really a critical part of how [stewardship] operates today.

Mr. Ensor: Los Alamos, Bob Webster.

I understand that under the plan you folks are going to be required to ramp up production of re-used and re-worked nuclear developments in a way that's never been done before, on a scale that wasn't contemplated. I guess my question is pretty basic, is that possible? Can you do that? And where will the tough parts be in making that happen for Los Alamos?

Bob Webster: For Los Alamos specifically.

Mr. Ensor: Yes.

Mr. Webster: I'll end up expanding that into the entire [inaudible] a little bit, right?

First, can we do it? Yes.

Mr. Ensor: You're sure.

Mr. Webster: Absolutely sure.

To Charlie's point earlier, you have to get funding, we have to fix some of the infrastructure, we have to bring the new staff along in doing the work. But what we're actually being asked to do is not that different than what we did in the past. We're

not really making brand new concepts of nuclear weapons. That's why we're able to use the [stewardship] and use the NIF and use the tools that we've got. We have a pretty good idea, and if you squint, the weapons all are kind of the same, right? So we're not making something that's fundamentally new and requires a new discovery. We're having to work the details, more of an engineering and applied physics than a basic discovery thing.

So we've done most of the processes. We're going to have assigned 30 pits per year by 2026 and we're going to get there. If the funding shows up and we install the machines and we train the people and we bring on the workforce that does all the support work, because to the discussion earlier, it's just like it's the servicemen and women out in the field. For us it's that staff of support that hold the laboratories up. That deal with the weights. That deal with the health physics safety. That's the big lift in terms of getting there.

The technology of coming back, the big questions are, to Kim's point, what materials can I substitute that are environmentally friendly or not known to cause cancer in the State of California? How do we do that and get that into the weapon systems today? That's where the big challenge is.

We've got most of the tools. I think we need to get the sub-crits a little stronger, but we've got essentially the tools that we need to do that task.

Like for pits, it's not like we've never built a pit. We actually built a pit last year that had we wanted to, it could have been used. I know it's your pit and technically it's your call on whether that's true, but I'm pretty knowledgeable along these things too.

So we're not that far away.

NNSA writ large, the big challenge is going to be the scale I think. For Charlie, the big challenge is going to be are we

able to scale the entire complex up fast enough to meet this bow wave of deferred modernization that we've kind of got to get through right now. That's going to be a pretty big challenge.

Mr. Ensor: If I can just come back to you a minute before going to Steve. On the size. Am I right that it's 80 pits, certified in the process, you're expecting the process to produce it?

Mr. Webster: The goal is no fewer than 80 pits per year by 2030.

Mr. Ensor: Why so many and what's the rush?

Mr. Webster: There's a couple of drivers for why to reconstitute the manufacturing. One is to take the opportunity to improve safety and security of the warheads. The other is to address growing uncertainty associated with the age of the systems that are presently there.

Plutonium is radioactive. It's changing as it's sitting there. There's a question about will that change ultimately the result in something that becomes unacceptable? So 80 pits a year gives us a prudent size to let us slowly and methodically refresh the current pits that are in, the current plutonium cores that are in the weapons now in a very methodical way over time.

Third, just to respond to changes that are out of our control of peer competition. It could cause us to have to change something to meet a new military requirement. It gives us that capability to do so.

That's why we've identified it. If you look back at Rocky Flats which was the original pit, they were able to make a thousand pits a year when they were [cloving], and we're asking for a prudent 80 pits because we think we can do this methodically over time.

Mr. Ensor: Thanks.

Steve, --

Mr. Webster: The longer we delay, though, the larger that number does become. The longer we delay, then 80 pits per year does grow to a larger number.

Mr. Ensor: Steve, talk to us about the Sandia role. This is a life extension program that has to keep costs down at the same time do all the science necessary to make sure that weapons are safe and reliable. I'm wondering for one thing if you could include it in your answer, is technological innovation changing what you can do in this regard?

Steve Girrens: Thank you very much for the question, but mostly thank you for the group that organized this session. I believe educating, turning up the volume on this education of the American public is key right now. It may be the biggest threat.

Admiral Kriete, I want to go back to two important things he said. One is it's a privilege to be able to go to sleep at night and not have to worry about the deterrent. That doesn't come without a cost. So that cost, that investment into the future is one of the things being challenged.

I am personally pleased and thrilled and honored to be here today representing 13,000 plus Sandians, who since President Truman asked 70 years ago have been delivering exceptional service in the national interest. Our mission number one, as the Admiral said, is safe, secure, effective. We break down effective into even two more words. We call it credible, reliable stockpile. The other word he said was always. Always. That takes continual attention to deliver that always, and at Sandia our role has been another part of the always, and that has been the never.

So what I mean by always never, always assured when the President demands, orders, and never for unintended use. Okay?

So that includes safety, nuclear safety, never nuclear safety in an accident scenario. And never in this area of what I call prevent unauthorized use. So that gets us into the surety aspects.

That's Sandia's two major roles. Our major, major role is arm, fuse, fire. And then nuclear safety and surety. That involves a lot of nuclear, non-nuclear components that we know have limited life and need to be replaced.

The other thing I want to mention is that we're not starting from stop. Sandia and Los Alamos have been engaged for almost 20 years now on the LAP for the Mark 4A W76-1 which was just successfully completed Christmas time, a year ago.

So the fly wheel is spinning. We've been working on the ALT-370 and the B61-12 since probably the '05, '06 timeframe, started work on that. The 76 started in 2000.

Workforce is key. It can be done because we are doing it. Forty percent of Sandia's workforce has been at the lab less than five years. Sixty-two percent have been there less than ten. This is the workforce that's delivering on these missions today and it's an exciting place to work.

Again, I have just as much confidence in our civilian workforce to continue to deliver as I do with the service people that we are honored to work with that come to the labs for some training.

Mr. Ensor: I'm glad you brought up workforce and I want to ask something about that but we're getting ready to ask your questions, so I'm going to turn to you in just a minute. One last question on personnel.

The gentleman from Sandia cited statistics that made it sound like your workforce is young. Am I wrong? I understand that 40 percent are within shooting distance of retirement overall. How

confident are you that you can find and recruit the caliber of scientists that you're going to need for this big project? You're competing with, among other places, other DoD labs for this kind of talent and you're not able to tell the young scientists how cool the stuff is they'll get to do because it's all classified and you can't talk about it. So how do you get these people in? Are you confident you can do it?

Mr. Girrens: I think through demonstration we have our eye on this ball. We're aggressively counting on the laboratories to hire. We're actually having job fairs where all of the organizations within NNSA are present and if somebody comes in and wants to work at Livermore, they happen to end up at a Tennessee table, the people from table escort them over to Livermore. So we are taking this on across the whole front.

So we recognize this is a challenge but we're rising through it and all indications are the sites are doing an excellent job. They're meeting their projections for bringing personnel on.

What I'll say about your question about attracting people, and maybe that goes to the importance of what you're doing here today too. What we did find is the previous, the last two Nuclear Posture Reviews were unclassified and they turned out to be two of our most important documents for attracting people because it sent a message to the people coming out of technical schools, leaving the services, graduating from graduate school, that the country felt that this was an important mission. So what we were finding for a lot of them is they wanted to work on something that was important. So we're using all of these types of tools to attract people, and then once -- and they're pretty smart. They understand some of the, they see the large computers, they see the experimental capabilities, they understand those issues so they're attracted by those things too. But foremost, it's something important about national security.

So all these efforts to try to educate the public are in my view

an assistance for us.

Mr. Ensor: Let me open it up now to questions from the floor.

Michael Gordon?

Question: Michael Gordon, Wall Street Journal.

I don't know who on the panel wants to answer this, but I'll put it forward. Last May General Ashley of DIA said that Russia was not observing the zero yield standard in the nuclear experiments, tests, whatever you want to call them they conducted [inaudible]. In fact they said China probably isn't either, but they didn't have the same degree of confidence in that judgment.

My question for you is, does going from sub-critical to extremely low yield, if an adversary is doing that, does that confer a military significant advantage? Or is it not really that important? And from your perspective, are you 100 percent satisfied being sub-critical if you could go from sub-critical to extremely low yield if national policy would allow you to do that? Would that enable you to do a better job of assuring the safety, reliability and replacement of nuclear systems? Or is the hardware and technology you have so impressive that you're just as good where you are now at sub-critical as you would be at low yield?

Dr. Verdon: I can't speak for why others do what they do, all I can tell is why what we do. We have a very rigorous process where every year we review through the three laboratories the status of the present stockpile. And for the 24th year, the three laboratory directors have said there is no technical need to return to testing to maintain confidence in our stockpile.

When you look at the experiments that we need, what I talked about and what was mentioned, we have identified a gap that we think we can address through continuing to enhance our

capabilities in the sub-critical experiments. So again, adhering to the zero-yield limit. That those will address the gaps that we have.

You know, you can never say never, but all I can say is thus far we have not found the need to return to testing to support the types of weapons that the military is asking us to provide.

Question: Dan Leoni for Defense Daily and Nuclear Security Deterrence Monitor.

Dr. Verdon, you all this year had to accept some consequences of an atrophied production complex and you elected not to use some electrical components for the 6-112 and 88 ALT-30 life extension programs. Consequently creating some funding pressure in the next upcoming fiscal year. Have you all told Congress in April or over the summer that to deal with that you discovered some efficiencies that could be applied to future LEPs? The 80-4 and the 87-1 for the cruise missile and the ICBMs? Could you tell us a little bit about those efficiencies and those changes that the NNSA is contemplating at this early stage to those future LEDs so that you can potentially shift some effort into the current LEPs?

Dr. Verdon: I can't go into super specifics, but I'll say we took, we're taking and have taken a very hard look at how to do things more efficiently, taking lessons learned out of the life extension programs that we have done to identify ways of doing things more efficiently that will allow us to avoid costs on the ongoing life extension programs. So we've done that with the W80-4 which we're not changing any of the requirements. We're still meeting all the requirements that have been identified for the warhead. But through our review of the processes that we utilize we've found ways to make them more efficient and hence avoid costs in that system.

For the 87-1, it's at the stage where, that's the warhead for the Ground Based Strategic Deterrent. It's still in the phase

where there are features where we outline the costs associated with that warhead that meet both threshold which are must requirements and objectives which are if you can requirements but maybe within the trade space, and it's a normal process to start to prune those back in working with the Department of Defense.

So we've already begun the process of actually taking down some of the objective requirements of that, again, hence avoiding, a cost avoidance that we can then move to support the 61 and the 88.

Question: In general terms, like in-source versus out-source? Anything at all you could color in?

Dr. Verdon: Some of it is literally just the number of development cycles that are needed to produce a component. We've identified ways to reduce the number of cycles. So you can just think of it as time and effort within the plants.

The other is that certain features or attributes on the warhead, we've determined with the military that we're not going to implement that feature. So we had allocated funds associated with that feature in the initial estimates.

And some of it is recall, even though we provide Congress a five-year budget window, we only get funded year by year. But the projections, when we identified the cost to Congress for the 87-1, we identified the cost for what I'll call the full-up warhead. But as we remove some of these features we can then take the money that we were saying we were going to use for the 87-1 and request Congress to allow us to apply it to the 61 and the 88 instead.

So it's both through feature reduction as well as efficiencies and the processes.

Mr. Ensor: Sylvie [Matong], Agence France-Presse.

Question: I have a question, and I'm afraid it's a stupid question, but you were speaking about the aging rockets and how they change as they are staying there in the siloes. Can you explain us in point terms how they change and what [inaudible]?

Dr. Verdon: How they change, you can think of them as the warheads just sitting there are a chemistry experiment. They're basically, you have a number of different materials sitting there in a relatively warm, mildly radioactive environment, and so that temperature over time, that mildly radioactive environment that they're sitting in, those can result in changes in the materials that compose the warhead, and that was recognized early on. The gray beards during the Cold War recognized this. They designed the warheads to last for a certain period of time. Through their great work we've been able to make them last longer. But eventually aging does take place.

You can think of like a plastic. If a plastic undergoes enough radiation damage over time, its characteristics will change. So ultimately it has to be replaced, or in some cases, in Steve's area, in some cases the warheads back when were designed literally with vacuum tubes. You can't find vacuum tubes anymore. So they have to be replaced.

Some of it is obsolescence and some of it is just aging because of the environments that they sit in, which was recognized when they were originally designed.

Mr. Ensor: Aaron, can I just ask you how concerned is the White House about the possibility that the budget will be under a continuing resolution for a while? And what impact will that have on this area?

Aaron Miles: That's a challenge that the departments face every year. This is certainly not the first year that we've faced the prospect of a continuing resolution or many continuing

resolutions with important work to do. That's a continuing challenge that we face as Dr. Verdon pointed out, having the reduced budget planning for multiple years but only being funded for one year. And hopefully being funded for that year in a time where you can still allocate money.

The largest cost question is a very good one. We've reached this situation where the Nuclear Posture Review acknowledges that the United States has actually lost the ability to produce a nuclear warhead. While North Korea can produce for example nuclear weapons. And we've laid out, individuals have laid out a number of things, both on the DoD side, on the NSA side, things that need to get done to ensure that we can maintain that deterrent capability in the coming years.

So it's natural to ask can we afford that. And there are arguments out there that we cannot afford both conventional defense and also for the cost of nuclear sustainment and modernization which CBO and some others I think, someone mentioned earlier, it could be a trillion dollars over 30 years. I think that always has to be put in context. The context is the United States spends a lot of money on its defense, and at current levels over that 30 years that's more than 21 trillion dollars on defense. So the nuclear piece of it, the we can afford survival piece from this morning, is about five percent of that. And most of that is DoD spending. Most of it is also not in the new system, but it's in the sustainment, it's in maintaining the United States as a nuclear weapon state.

So if you look at what is the trade space? You look at some of the proposals that have been put forward in recent years. They're things like canceling a couple of enhancements that were referenced earlier. It's eliminating without, or retiring without replacement the last cruise missile in the arsenal. It's reducing the number of submarines. It's eliminating the entire ICBM leg of the triad. Unilaterally reducing the strategic deployed stockpile a third below current levels.

Doing all of those things in combination together can maybe reduce that 30 year outlook from 21.5 trillion to 21.3 trillion. So it's great to talk about what capabilities we really need which will best strengthen U.S. security, but the idea that you have to make these major changes and accept whatever attendant risk comes with it I think is at best a little tenuous.

So this is a challenge. It's a challenge that we as a government as a nation can undertake, and the departments will continue to work through the kind of years to year challenges associated with the way that the government funds its programs. Continue to work that and continue to work the long-term picture and challenge as well.

Mr. Ensor: I think we have time for one more question.

Question: [Inaudible] Standard.

I guess this question is for Dr. Verdon. Ellen Lord, excuse me for forgetting her full title, but has called successful pit reduction a lynchpin on the fact that in a sense we do agree with and what does that mean [inaudible] equation [inaudible]?

Dr. Verdon: Clearly reestablishing our capability and making sure it hits at the quantity that we've identified is one of our top priorities and it is, in our view, a key focus area that we're committed to. So again, both making sure that Los Alamos meets their 30 pits a year; and implementing our preferred option of the second site at Savannah River. That's where we're moving out to implement that.

A lot of people have always highlighted this issue that studies have found that maybe we won't achieve 2030. The only thing I'm certain of is if we don't start, we won't achieve it. So I think it's important for us to commit to start and to go and try to meet that goal. So we are committed to doing that. The Savannah River site would play a key role in our solution of producing the 80 pits per year.

Mr. Ensor: We got started ten minutes late and we're ending ten minutes late. So why don't we, with permission from MITRE, why don't we plan on a coffee break and resume at 11:55? Ten minutes later. Is that okay, Adam?

Mr. Hebert: Sure.

Mr. Ensor: Please join me in thanking this very distinguished and excellent panel.

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