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**FUTURE OPTIONS FOR THE U.S.
NUCLEAR DETERRENT—VIEWS
FROM PROJECT ATOM**

HEARING

BEFORE THE

SUBCOMMITTEE ON STRATEGIC FORCES

OF THE

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FUTURE OPTIONS FOR THE U.S. NUCLEAR DETERRENT—VIEWS FROM PROJECT ATOM

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
SUBCOMMITTEE ON STRATEGIC FORCES,
Washington, DC, Tuesday, November 3, 2015.

The subcommittee met, pursuant to call, at 3:29 p.m., in room 2212, Rayburn House Office Building, Hon. Mike Rogers (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. MIKE ROGERS, A REPRESENTATIVE FROM ALABAMA, CHAIRMAN, SUBCOMMITTEE ON STRATEGIC FORCES

Mr. ROGERS. Good afternoon. This subcommittee will come to order.

Welcome to our hearing on “Future Options for the U.S. Nuclear Deterrent: Views from Project Atom.”

For those who haven’t read it yet, Project Atom is a unique and very timely study on the future of the U.S. nuclear deterrence. It is unique because it brings together perspectives from across the policy and political spectrum to examine this most important of national security issues.

Four different think tanks participated and had what appears to be a spirited debate of the critical issues. And Project Atom is timely because it is so sorely needed. As some of the materials for the study say, it helps fill, quote—“the current deficit in the national security attention paid to the continued relevance and importance of the U.S. nuclear strategy and force posture,” close quote.

This committee has been striving to correct this deficit as well. And we welcome Project Atom and its contributing authors in support of that cause.

Chairman Thornberry’s nuclear deterrence week of hearings and classified briefings this summer was a step along that same path. This subcommittee will continue to work to inform Congress and the public on the requirements for a robust and credible nuclear deterrence long into the future.

My hope is that Congress and the executive branch, particularly in the next administration, will take a hard look at Project Atom and what it is trying to tell us, because the bottom line is that the world is not standing still. We are not returning to the Cold War, but we are also not returning to the 1990s when so many people believed international peace and love would reign indefinitely.

We need a clear-eyed view of the world’s other nuclear states and would-be nuclear states and what we must do to ensure nuclear deterrence holds and nonproliferation prevails.

In the short term, we need to focus on building a nuclear strategy, posture, and enterprise that is flexible and responsive. Our witnesses have lots of suggestions on that front and this committee has advanced legislation toward that goal.

In the long term, I believe we need to rethink the logic behind a policy that keeps the United States indefinitely maintaining a nuclear capability we had in the 1990s.

As other nations, Russia, China, North Korea, Pakistan, continue to research and deploy new nuclear capabilities over the coming decades, the logical question that we must ask is, will the nuclear deterrence capabilities the United States had in the 1990s be credible in 2040?

Unless you believe global zero is going to happen any day now, and if you do then I have a bridge to sell you, we are going to have to reexamine that policy. A choice will be made on this front, not right now, but sometime in the coming years. In the meantime, we can discuss all of this with our panel of witnesses.

Thank you all for being here today and contributing to the study. We know it takes a lot of time to prepare for these hearings and we really appreciate your commitment.

The witnesses are Dr. Clark Murdock, senior adviser, Center for Strategic and International Studies; Dr. Keith Payne, professor and department head, Missouri State University; Mr. Elbridge Colby, Robert M. Gates senior fellow, Center for a New American Security; Dr. Barry Blechman, co-founder of the Stimson Center; and Dr. Adam Mount, independent consultant.

With that, I will turn to my friend and colleague, the ranking member from Tennessee, for any statement he may have.

[The prepared statement of Mr. Rogers can be found in the Appendix on page 37.]

Mr. COOPER. Thank you, Mr. Chairman. Thank you for holding this important hearing. And I look forward to the testimony of the witnesses and ask that my statement be inserted for the record.

[The prepared statement of Mr. Cooper can be found in the Appendix on page 39.]

Mr. ROGERS. We will now ask each of our witnesses to make an opening statement, summarizing their prepared testimony, and ask to keep that to 4 or 5 minutes.

Your written testimony will be, without objection, entered into the record. Also without objection, I want to enter into the record the full Project Atom report.[†]

Mr. ROGERS. Without objection, so ordered.

We have provided a copy of that report to each of the members and have a few available for others as well.

Now, let us hear from the witnesses in this order. First, Dr. Murdock, you are recognized for 5 minutes.

[†] Excerpts from the Project Atom report can be found in the Appendix beginning on page 103. The full Project Atom report is available at <http://docs.house.gov/meetings/AS/AS29/20151103/104109/HHRG-114-AS29-20151103-SD001.pdf>.

**STATEMENT OF DR. CLARK A. MURDOCK, SENIOR ADVISOR,
INTERNATIONAL SECURITY PROGRAM, CENTER FOR STRA-
TEGIC AND INTERNATIONAL STUDIES**

Dr. MURDOCK. Thank you very much, Mr. Chairman. Thank you very much, Ranking Member Cooper. It is a great opportunity to come here and talk about the Project Atom study.

It was designed as a sort of blue-sky look into the future without constraints, policy constraints or strategy constraints, as to what kind of nuclear needs, what kind of strategy the United States should follow in the 2025 to 2050 timeframe.

So as I said before, this was unconstrained either by current strategy, by which I mean reducing the role of nuclear weapons, as an example, or by current policy, which is no new nuclear capabilities, no new nuclear weapons.

So we are out into the 2025 and beyond timeframe. The approach we took was a competitive strategies approach. This was funded by Smith Richardson [Foundation] in part because we took the competitive strategies approach to it. So I went out and recruited three independent think tank teams to participate in this.

The first was headed by Keith Payne from the National Institute for Public Policy, Bridge Colby from the Center for a New American Security, and Barry Blechman from the Stimson Center. And each of them formed a small, analytic team that operated throughout and attended the working group, members, and then presented their views, defended their views.

And then once that process was complete, then I stepped back and wrote what I thought was the right approach to take towards a nuclear strategy and its postured needs. And then I defended that in another working group meeting consisting of outside experts and the members of the various independent study think tank teams.

So the approach was one of develop a common analytic framework, think through what are the requirements of that security environment, what kind of adversary strategies would be followed, what kind of technological possibilities would be open in the nuclear realm in the 2025 to 2050 timeframe, and then each of us took a separate look at what should be our strategy.

My dynamic that I thought was most important were the dynamics that flowed essentially from U.S. conventional superiority. That is, in a world in which nations are seeking to deal and cope with a conventionally superior adversary, namely the United States in this case, would increase their reliance upon nuclear weapons as a way to deter us.

And essentially, our conventional superiority, in a sense, lowers the nuclear threshold because it increases the incentives for other nations to resort to nuclear weapons as a way of trying to prevent our intervening in, say, regional adventurism that they might be following.

So my belief is, is that in order to counter other nations' potential interest in using nuclear weapons early in a conflict is that we need to develop a set of robust, discriminate nuclear options in order to be able to respond both proportionally and in kind to any possible use of a nuclear weapon against the United States and its allies.

I am concerned about the fact that we have a force structure largely and a posture largely determined by Cold War needs. The warheads are larger, many of them are less discriminate, many of them carry high collateral damage. And if confronted with the situation where an adversary used a special-effects, low-collateral weapon, nuclear weapon, against the United States or one of its allies, that we may be self-deterred from responding because we do not have a discriminate or a proportional or an in-kind response that is suitable to that use of a nuclear weapon.

So one stress is on what kind of nuclear response options we have. We need to be able to deny the attractiveness of nuclear escalation to our potential adversaries. So we need a new set of capabilities in that area.

Another area that I think is particularly important is to look at the requirements for extended deterrence. During the Cold War, the United States coupled its security to the security of our allies, both in the European theater and the Pacific theater.

We tend to forget that during the height of the Cold War the United States had forward deployed 7,000 nuclear weapons in Europe during that time, so that when the Soviets looked at what would happen if they engaged in major conventional aggression, because we perceived, correctly so, that our conventional forces were inferior to the Warsaw Pact forces, they knew that a conflict would go nuclear because there were 7,000 nuclear weapons there.

We also had a thousand nuclear weapons deployed on the Korean Peninsula because we wanted to protect the security of South Korea, and they wanted those nuclear weapons there because they knew that the presence of nuclear weapons on their territory would be credible in terms of potential adversaries.

So I think another aspect of our force structure as we move forward, our nuclear force structure as we move forward, is the need to have rapidly deployable and rapidly deployed nuclear weapons that can be either deployed forward during peacetime or can be rapidly moved forward during a moment of crisis in order to provide the nuclear umbrella that we are talking about.

So with those two comments, I will let the other think tanks speak for themselves and pass the floor to Dr. Payne.

[The prepared statement of Dr. Murdock can be found in the Appendix on page 40.]

Mr. ROGERS. Dr. Payne, you are recognized for 5 minutes.

STATEMENT OF DR. KEITH PAYNE, PROFESSOR AND DEPARTMENT HEAD, GRADUATE DEPARTMENT OF DEFENSE AND STRATEGIC STUDIES, MISSOURI STATE UNIVERSITY

Dr. PAYNE. Thank you, Mr. Chairman and Ranking Member Cooper. It is an honor to be here.

The assessment by my colleague Tom Scheber and myself is based on——

Mr. ROGERS. You need to turn your microphone on.

Dr. PAYNE. Yes, sir.

The assessment by my colleague Tom Scheber and myself is based on the proposition that the size and character of the U.S. nuclear force posture needs to be driven first and foremost by a realistic appraisal of international conditions and threats. That is a key

presumption because today's international threat environment is extremely dynamic and challenging.

The comforting assumption of a relatively benign new world order and a perpetual peace dividend has been overtaken by the reality of multiple, highly threatening developments, including new nuclear threats. And as Secretary of Defense Ash Carter recently noted, there is no apparent end in sight for these developments.

Given this threatening and indeed surprising security environment, the United States must prepare its forces to deter foes and assure allies through many possible negative shifts in international relations, including the erosion of U.S. conventional superiority, at least in some key areas.

We need to plan our deterrence and assurance strategies and capabilities according to these realities, not past unrealistic hopes and expectations.

In this context, the proposition that the goal of nuclear disarmament should be the overarching driver of U.S. nuclear policies, I believe, is misguided and even dangerous. Why? Because nobody has offered even the vaguest credible outline of how to make nuclear disarmament a reality in an international system that is characterized by hostility, mistrust, and conflict. And no nuclear power has followed the U.S. lead in this regard.

So what are the pertinent implications of these realities? The U.S. force posture must be sufficiently adaptable, flexible, and resilient to deter a variety of threats and foes in many possible contingencies now and in the future.

As former STRATCOM [Strategic Command] Commander General Robert Kehler has observed rightly, and I quote—"Surprise is a problem in a constantly changing world. In my view, the future requires adaptive and flexible U.S. capabilities to respond to unanticipated threats." Precisely right.

The U.S. must work to sustain or expand these force posture qualities: adaptability, flexibility, and resilience. That is the primary standard of adequacy we need to meet now and for the future.

There are several steps that could be taken to increase the adaptability of U.S. forces, particularly including modernizing the U.S. nuclear triad and forward-based forces. Further deep reductions in U.S. nuclear forces, however, would likely instead undercut these very qualities that may be critical to being able to deter war and assure nervous allies.

In addition, I should add that if you care about nonproliferation you must care about maintaining the capability and the credibility of the U.S. nuclear extended deterrent. The U.S. nuclear umbrella is the single most important nonproliferation tool that we have.

In conclusion, U.S. forces must be able to adapt to an increasingly dangerous and unpredictable threat environment, not geared to past, set expectations of a benign new world order, enduring U.S. conventional force superiority, a never-ending peace dividend, or an overarching goal of nuclear disarmament.

The now-apparent dangers of the post Cold War threat environment have come to many as a big surprise. For two decades, Western defense thinking in general has been geared to a new world

order in which nuclear weapons would play an ever-smaller role on the path to nuclear zero.

General Breedlove, NATO's [North Atlantic Treaty Organization's] Supreme Allied Commander, recently acknowledged that for two decades the U.S. has treated Russia as a potential ally. That belief has been the backdrop for decades of deep U.S. nuclear reductions and a general lack of attention to U.S. nuclear forces.

Now, however, as General Breedlove said further, we must readjust. The realities of contemporary threats now argue strongly in favor of modernizing U.S. nuclear forces and emphasizing their adaptability, not further reductions and greater rigidity.

That is the primary takeaway from the assessment that my colleague Tom Scheber and I provided. Thank you.

[The prepared statement of Dr. Payne can be found in the Appendix on page 50.]

Mr. ROGERS. Thank you, Dr. Payne.

Mr. Colby, you are recognized for 5 minutes.

**STATEMENT OF ELBRIDGE COLBY, ROBERT M. GATES SENIOR
FELLOW, CENTER FOR A NEW AMERICAN SECURITY**

Mr. COLBY. Mr. Chairman, Ranking Member Cooper, and distinguished members of the committee, thank you very much for inviting me to testify on the future of America's nuclear deterrent.

It is an honor to speak to you today on this matter of the greatest importance to our Nation's security.

We are entering a period of significant and possibly dramatic change in both the geopolitical and the military technological spheres. In brief, the United States is likely to confront more significant challenges to its interests from countries like China in Asia and Russia in and around Europe.

At the same time, U.S. conventional military advantages over its plausible opponents will likely narrow. This will have major implications for U.S. defense strategy writ large, but also for our nuclear deterrent. Accordingly, the United States needs to adapt its nuclear policy and posture.

What in particular should change? If the United States continues to want to extend deterrence effectively, as I believe it should, U.S. nuclear weapons need to do more than threaten unhindered devastation. Thus, while the ultimate source of U.S. deterrence should, of course, remain the threat of overwhelming destruction, the United States should also prepare for and make clear that it would, as appropriate, use its nuclear forces in more limited fashion for more focused effect.

In particular, the United States should adapt its nuclear forces to be able to fight a limited nuclear war more effectively than its plausible adversaries. Such superiority would give the United States important and possibly crucial leverage to defend its interests in both peace and war.

The U.S. nuclear force of today is not, however, optimally designed for this demanding set of criteria. To optimize its nuclear force, the United States should do the following.

Invest appropriately in an improved nuclear command and control system such that U.S. nuclear forces can perform their mis-

sions reliably under any plausible conditions and do so in sufficiently controlled and deliberate ways.

Maintain the nuclear triad to ensure a resilient, redundant, and highly capable nuclear deterrent.

In addition to fully funding the SSBN [ballistic missile submarine] replacement and replacing the Minuteman III, the United States should maintain and modernize its fleet of nuclear-armed bombers. This modernization effort is particularly important in light of the unique attack capabilities found in the bomber force, but also in the growing challenges to stealth and its ability to penetrate. This effort should include procuring the LRSB [Long-Range Strike Bomber] in sufficient numbers, maintaining the B-52H and B-2A, buying sufficient dual-capable F-35s for regional deterrence and assurance and acquiring the Long-Range Standoff [LRSO] option missile.

The United States should also move in the direction of providing most or all of its nuclear forces with variable-yield warheads or weapons that can provide a variety of types of effects, such as electromagnetic pulse, different height of bursts, use at sea and so forth, so that the United States can more effectively tailor strikes from the full range of its available platforms.

The United States should in particular focus on making the ballistic missile force more capable of discriminate strikes. The United States should accordingly render at least some portion of the Trident II D5 SLBM [submarine-launched ballistic missile] arsenal capable of lower-yield strikes, for instance by using primary-only warheads.

The United States should also ensure that the LRSO is capable of discriminate employment by arming it with a variable-yield warhead.

Given the proliferation of hardened and deeply buried targets, or HDBTs, earth penetration should be a special focus of long-term research and development and ultimately procurement. This is vital, I emphasize, both for deterrence and for stability.

The size and composition of the nuclear force should be determined based on strategic considerations. Arms control should be pursued where and so it contributes to stability, but not for the sake of reductions.

In closing, the world is changing in ways that dictate that U.S. nuclear policy and posture should also change. The United States should grasp the opportunity to make such changes while unfavorable trends are still nascent and susceptible to counteraction. I believe a modernization program along these lines would add to a favorable stability and ultimately to the kind of peace we and our allies justifiably seek.

I look forward to any questions you might have. Thank you very much.

[The prepared statement of Mr. Colby can be found in the Appendix on page 61.]

Mr. ROGERS. Thank you, Mr. Colby.

Mr. Blechman, you are recognized for 5 minutes. Dr. Blechman, I apologize.

**STATEMENT OF DR. BARRY BLECHMAN, CO-FOUNDER,
STIMSON CENTER**

Dr. BLECHMAN. Thank you, Mr. Chairman, Mr. Cooper, members of the subcommittee. This is a good opportunity.

I have a rather different view than my colleagues in this project and I will briefly summarize it.

Now, in my view, U.S. security benefits by seeking to minimize the importance and roles of nuclear weapons in the perceptions and actions of foreign leaders. For the United States, nuclear weapons serve only to deter nuclear attacks on ourselves and on our allies.

Maintaining U.S. conventional superiority is the key to U.S. security, and our nuclear weapon programs harm this by raising the prospect of false alternatives, such as being able to fight controlled nuclear wars, and by their direct effects on budgets and on the training of U.S. military personnel.

So in summary, I believe the U.S. should work diplomatically to constrain nukes as circumstances permit, adopt policies and doctrines and work politically to strengthen the nuclear taboo and adjust force posture and modernization programs to reduce expenditures.

Our security depends mainly on political leadership, on diplomacy, and on our economic instruments of power, private and public. And it also depends on our conventional superiority, which is due to the scale and longevity of our investments and advanced technologies and systems on the size of our forces and on the quality and training of our people.

We can't do everything with military force, but we can defeat any conventional threat we face currently. China and Russia are making advances, but I believe the U.S. should be able to maintain superiority if our citizens remain willing to allocate sufficient resources. And I would be happy to debate this point during the questions.

Maintaining our technological and quantitative conventional edge should be our highest priority. And this will be hampered increasingly by the bow wave of nuclear spending that we are facing in the next decade.

In my view, the primary goal of our nuclear policy should be the elimination of nuclear weapons from all nations. I recognize this is not going to be achieved until many, many political conflicts are resolved and may never be achieved, but it is certainly a goal that I think should be a vision that should be underneath our policies.

Until elimination becomes feasible, if it ever does, the U.S. should, one, stress a firm commitment to nuclear retaliation for any nuclear attack, be clear that any nuclear attack on the U.S. or our ally will result in retaliation no matter how small the yield of the attack, no matter what the target might be or whatever the range of the launcher which was used to fire the weapon, but we should also make clear that this deterrent role is the only purpose of U.S. weapons.

Deterrence, in my mind, depends not on nuclear capabilities, but on boots on the ground. If we are concerned about the possibility of Russian incursion in the Baltic states, we should and I believe we should greatly improve NATO's presence on the ground in those countries so that the Russians never come to the misperception

that they can perform a fait accompli before NATO can respond to that. And there are ideas around to put the equipment, pre-deploy equipment, for U.S. armored brigades in those countries, and I strongly support those ideas as well as related things.

So the implications of this policy for U.S. nuclear forces are, one, as the current generation ages out I believe we can reduce the number of our forces unilaterally. I think we should maintain a triad, but that could be reduced to perhaps 8 to 10 submarines, to 2 Minuteman wings with only modest investments can be maintained viable until the 2040s.

I believe we should put a high emphasis, high priority on the new bomber, primarily for its conventional role, but also for a nuclear role. I think we should phase out tactical nuclear weapons as their service lives expire, because there is nothing those weapons can accomplish that could not be accomplished by a long-range strategic bomber armed with a variable-yield weapon.

And finally, I think we should divert the resources we save by making those reductions to our conventional capabilities, particularly command and control survivability, which I agree with Bridge on that, on continued R&D [research and development] on defenses, missile defenses, and deploying such defenses as the technologies mature, and on cyber and EW [electronic warfare] capabilities and on advanced conventional technologies.

Thank you very much.

[The prepared statement of Dr. Blechman can be found in the Appendix on page 75.]

Mr. ROGERS. Thank you, Dr. Blechman.

Dr. Mount, you are recognized for 5 minutes.

STATEMENT OF DR. ADAM MOUNT, INDEPENDENT CONSULTANT

Dr. MOUNT. Thank you, Chairman Rogers, Congressman Cooper, members of the subcommittee. Thank you for the opportunity to discuss this with you today.

The world that we are entering is indeed a period of strategic competition. However, this does not mean we are in a new Cold War. Today's challenge is one of maintaining stability in regional contexts and defending the core interests of U.S. allies against limited, but persistent, encroachment.

Both China and Russia are engaged in extensive programs to modernize their nuclear arsenals. But with a few important exceptions, both countries are replacing legacy systems that have reached the end of their service lives. Neither country plans to operate a submarine force capable of maintaining boats continually on station near our shores and neither plans to construct a low, observable bomber platform. For the foreseeable future, U.S. nuclear forces will remain markedly more capable.

Recent calls to build new nuclear weapons and to deploy them closer to potential zones of conflict represent a dramatic departure from longstanding, bipartisan consensus nuclear policy. Since the 1980s, Presidents of both parties have worked to reduce the salience of nuclear weapons in our military planning, to gradually reduce our nuclear stockpile and to refrain from procuring new capabilities.

New nuclear weapons are unlikely to be effective instruments for deterrence or defense in this new era of hybrid conflict. Both Russia and China are likely to continue to pursue their objectives with operations that remain well below the threshold of war. Nuclear weapons, no matter what kind and no matter where they are stationed, cannot deter this kind of threat. They cannot help to roll back Russian occupation of Crimea or put a halt to Chinese land reclamation in the South China Sea.

At the same time, it is far from certain that low-yield and special-effects nuclear weapons are necessary for deterrence or escalation control. The United States cannot be certain that these weapons will deter better than the strategic arsenal or that they will restrain an adversary from conducting further nuclear strikes.

The enormous strategic and diplomatic costs of employing a tactical weapon make it unlikely that they would be utilized, which in turn decreases their utility as instruments of deterrence. China and Russia are already threatened by American superiority. New nuclear programs would likely cause them to accelerate their modernization efforts, contributing to what former Secretary of Defense Bill Perry recently warned is a new round in the nuclear arms race.

For these reasons, imbalances should be addressed through verifiable arms control agreements. For this reason, the United States should press Russia to engage in negotiations, not only to limit existing nuclear systems, but also the procurement programs that each country finds most threatening.

Initiating new nuclear procurement programs in the United States would also have serious effects on the national defense budget. If history is any precedent, Congress is unlikely to obligate funds for a hundred new bombers and 12 new *Ohio*-replacement submarines on top of numerous other outlays.

Unexpected cuts to core systems of the triad will require changes in strategy and operations. At the same time, nuclear modernization plans also place significant pressure on other military priorities, especially in Navy shipbuilding and the F-35 program.

Congress and the White House should seek prudent cuts to the modernization plans in advance so that the services can plan for the future. Specifically, Congress should require the Department of Defense [DOD] to generate studies that explain the need for a new cruise missile, examine the effect of moving to a force of 8 to 10 ballistic missile submarines and to provide regular cost estimates of new spending on nuclear systems, especially the new Long-Range Strike Bomber.

Lastly, the costs of seeking new nuclear capabilities are not only monetary. Reneging on the U.S. commitment not to build new nuclear capabilities could stress a beleaguered nuclear nonproliferation treaty regime to the breaking point, and thereby deprive the United States of important tools to prevent the spread of nuclear weapons.

At the same time, new procurement efforts would encourage the other countries to seek these capabilities. It is far safer to maintain that nuclear weapons are not an effective means of controlling escalation.

In conclusion, current and projected strategic conditions do not warrant major changes to longstanding nuclear force structure. It is critical to national security and the Nation's standing in the world that the United States maintain its commitment not to seek new nuclear capabilities and to continue gradual negotiated reductions of its nuclear arsenal.

Thank you.

[The prepared statement of Dr. Mount can be found in the Appendix on page 91.]

Mr. ROGERS. I thank you, Dr. Mount.

And I thank all of the witnesses.

And I would like to recognize myself now for the first round of questions.

As you heard me say in my opening statement, I am worried that the current U.S. nuclear strategy and posture is not suited to the world we are finding ourselves in during the 21st century. It seems to be based on what you might call the hopeful aspirations of the mid to late 20th century.

Dr. Murdock, you served in the Clinton administration's Department of Defense during those heady days. Your bio has pegged you as a long-range planner. So let me ask you, do you think the current nuclear strategy and posture keeps us secure for the long run? And if not, what do you suggest we change and what action should this committee take to get us back on the right track?

Dr. MURDOCK. Thank you for the question. I have described myself as a long-range planner. It is one of the reasons why we put the horizon for Project Atom out to 2025 to 2050 because we have to think about systems that will take 10 to 15 years to develop, systems that will have lifetimes of 35 to 50 years. So you have to think in terms of a longer-range perspective.

As I look into the deeper future, the longer-range future, I think that the risks of proliferation are higher. We are already dealing with potential near-term risks of nuclear proliferation in the Middle East, but there are similar pressures in other regions of the world. And in a more highly proliferated world, I think we have to develop the kind of capabilities that can deter the kinds of nuclear employments that our adversaries may make against us.

It means, in my mind, that we have to develop discriminate, low-yield, variable-yield, special-effects weapons so that we can respond in kind and respond proportionally to any potential use of a nuclear weapon against the United States or its allies. I think that this emphasis upon being able to respond proportionally and in kind is critical for deterrence during this time.

As I said before in my statement, I worry about the prospect that if we are confronted with a limited nuclear use against us, that because of the character of our weapons, that we may be self-deterred from responding in kind because we would have to go too high up the escalatory ladder, use too large a yield bomb or missile or warhead, and it is important that we develop the robust set of options so that a President can respond proportionally and in kind to any use of a nuclear weapon against us.

This is not saying that we have to go out and seek superiority. Right now we are in a position of inferiority when it comes to non-strategic nuclear forces, otherwise known as tactical nuclear weap-

ons. The Russians have somewhere between 2,000 and 4,000. I am sometimes not sure they even know how many they have. We have forward deployed approximately a couple of hundred, and very small inventories back here in the United States.

So my feeling is that we do not have to address this quantitative superiority that the Russians have maintained in this class of systems, but I do believe we have to develop a range of options so that we can respond discriminately to any potential use of those tactical nuclear weapons by the Russians.

Mr. ROGERS. Thank you.

Dr. Payne, you were a primary author of George W. Bush's administration in his Nuclear Posture Review. How has Russia as an actor on the world stage, in particular in nuclear affairs, changed since then?

Dr. PAYNE. Well, we first saw evidence of a change in Russian behavior and Russian doctrine in 2008 where, according to senior Russian officials, Russia was ready to call a nuclear alert with their actions and operations against Georgia in 2008.

We have more recently seen Russia back up its operations against Crimea and the occupation of Crimea with what President Putin himself said was a nuclear escalation threat.

So what we have learned since those days of writing the 2001 Nuclear Posture Review is that Russia has moved in a direction in some ways much harsher, particularly in terms of its potential use of nuclear weapons, than we anticipated at the time.

We have seen the evolution of Russian doctrine, we have seen the evolution of Russian strategy and the evolution of Russian forces to where at this point I think you can honestly and quite fairly say that Russia has a nuclear first-use policy, a limited nuclear first-use policy, that is meant to backstop its territorial grabs in Central Europe and Southern Europe.

And given that, it seems to me that we need to move in the direction that Clark just outlined, if only to be able to deter. I mean, I am not interested in being able to respond, per se, to a nuclear war, but we want to be able to deter the nuclear war in the first place. So we want to be able to deter the Russian Federation from believing it can get anything useful out of a first-nuclear-use threat. And in my opinion, that requires exactly the type of capabilities that Dr. Murdock was just describing.

Mr. ROGERS. Great.

And Mr. Colby, your testimony suggests that the U.S. should make its nuclear forces more flexible and create the ability to tailor nuclear strikes in a narrower fashion than available today. You mentioned low-yield warheads, tailored effects like EMP [electromagnetic pulse], earth penetration, et cetera.

Compared to what our current strategic arsenals provide, how would these types of new capabilities provide increased deterrence toward adversaries, and why do we need them?

Mr. COLBY. Thanks, Mr. Chairman. I would like to build on a previous comment which I generally agreed with. I think the basic problem here is that we are extending deterrence far and wide as part of our Nation's grand strategy, and that includes countries like the Baltic States, like the Philippines, to some extent maybe Taiwan, countries very close to our potential adversaries and ad-

versaries that have not only increasingly powerful conventional militaries, but also survivable nuclear forces. So whatever they do to us, to some extent they could hit us back very seriously.

The problem is, as Clark and Keith described, is an adversary may think that he can escalate, especially if he creates favorable conditions on the ground, for instance through the use of little green men in the Baltics, and then use his conventional forces to create a favorable situation, such as a *fait accompli*, and then threaten to escalate to deescalate of some kind, basically say I dare you to come at me and go big, even just conventionally, but you are going to have to go big in such a way that it is going to look really escalatory and really dangerous.

And if we do that, he may decide, you know, just to take one scenario, he may decide to use nuclear weapons in a very tailored, very limited way, specifically designed not only to hurt us militarily, but also to scare not only us, but all our allies in this endeavor.

And the problem is that if we only have big response, you know, as Clark put it, we are very potentially going to be self-deterred, but also even if we executed it, the Russians, for instance, would have a way of responding in a very dramatic and catastrophic fashion.

So far better for us and far better for deterrence if we have roughly proportionate, same order of magnitude ways of saying don't think it is going to make sense for you to escalate to the nuclear level, even in this sort of clever escalate-to-deescalate way. We have a way of defeating that strategy.

I mean, to put it kind of bluntly, an adversary is less likely to raise on you if he knows you have good cards. And I think that these kinds of capabilities are basically good cards.

Mr. ROGERS. Great, thank you.

The Chair now recognizes the ranking member for any questions he may have.

Mr. COOPER. Thank you, Mr. Chairman.

First, Dr. Murdock, I appreciate your leading a very provocative report. It is very helpful to get this discussion started.

I was wondering first off when you picked three other think tanks, what points of view are left out? What think tanks or viewpoints could have or should have been included?

Dr. MURDOCK. That is an interesting question, sir. What I was trying to do was to get what I refer to as think tanks that were representative across sort of the broad middle of the spectrum of opinion. There are many people in this town who are more conservative than Keith Payne. There are many people in this town who are more liberal than Barry Blechman.

But I do know that first of all the two of them can be in the same room and talk to each other. That is not true of people that are further divided on the spectrum of opinion. And since I am holding a lot of working group meetings, I want to make sure that people can come in and talk to each other.

So what I was looking to do was to bound the range of opinion to what I would say was the reasonable left and the reasonable right, although people may disagree in that kind of characteriza-

tion, they may even themselves disagree on that characterization, and then find somebody who was a bit more centrist.

I probably should have done a little bit more research on this because Bridge, who I did want to include because he is a member of the next generation of thinkers that are coming up and I do a lot of work on that level as well, that Bridge was probably a bit closer to where Keith was than he was to where Barry was. That is true.

And it turned out that both of them were closer to—that I was closer to where both of them were than I was to Barry.

But there are clearly—we bounded the middle of the spectrum of opinion with Keith Payne, that I did, with Keith Payne and Barry Blechman, that did not go further out onto the margins.

Mr. COOPER. In the report, it seems that everybody agrees on keeping the triad. Everybody agrees on improving command and control. And most of you want basically every weapon in the arsenal that we don't have, you know, with varying the yield and other criteria.

So on the yield, on page 20 of your report, you talk about how the massive ordnance penetrator, the MOPs, at 30,000 pounds is about 20 times smaller than our smallest nuke. So presumably you want to fill that gap with something that would be proportionate and discriminate.

Are there key points within that? Do we need a mid-way weapon? Do we need—what exactly are you looking at sub-kiloton?

Dr. MURDOCK. I think it depends entirely, from my perspective, it depends a great deal on what we know about what the Russians are developing. We know that the Russians are doing experimentation in the very lower end of the nuclear yield.

I personally believe that the deterrent impact of a nuclear weapon partially resides in its ability, you know, in terms of how much damage it can effect, the blast heat, the fragmentation that is associated with any weapon, but it is also a nuclear weapon. It has a radioactive signal. It indicates a willingness to break a threshold.

Barry referred to the nuclear taboo that has essentially been in existence since Hiroshima and Nagasaki, so that there are those who believe that we can have a complete continuum from conventional to nuclear.

I am happy to have a break between conventional weapons and nuclear weapons. Perhaps the Russians have developed a system that is somewhat larger than our largest conventional bomb and somewhat smaller than our smallest nuclear weapon. If that is the case and they feel that by using it under certain circumstances that they can go nuclear without threatening our spectrum of responses, that is something I want to be able to respond to in kind.

So my belief is, is you design, you know—it is our adversaries, because of our conventional superiority, who are increasing their reliance upon nuclear weapons, who have been experimenting and developing nuclear capabilities that are more varied than ours. And I think that that is the principal driver of what kind of capabilities we need to have.

Mr. COOPER. How do you define what is a new nuclear weapon as opposed to a refurb?

Dr. MURDOCK. Well, it is a little bit like angels dancing on the head of a pin. When you are talking about a life extension program where you replace many, many elements, the conventional elements that are part of the warhead, at what point do you have a new weapon?

Well, if it is still the physics package, the nuclear portion of it is still within the range of what existed there, you know, people say, well, it is not a new weapon.

I mean, my belief is that when we are going into an environment where there is an increased risk of our potential adversaries breaking the nuclear threshold, I want a new weapon. I could say, well, we can adapt this particular weapon we have so it comes pretty close to it.

I want to be able to convince our adversary we have already thought about what you want to do, we are developing new weapons to counter that, we are going to ensure that those weapons work to our stockpile stewardship system, and we are going to train with them and exercise with them so that it will be credible and our adversaries believe that if they use a nuclear weapon we will use one in response.

You don't do that by just saying it. I believe you have to do it by fielding the appropriate weapons, by practicing with them, by training with them so that our adversaries will understand if you go nuclear we are prepared to deal with that, too.

Mr. COOPER. You used the analogy of angels dancing on the head of a pin. I assume you are not discounting the distinction between what is new and what is a refurbishment of an older weapon.

Could we, using our existing stockpile, create enough sub-kiloton weapons or other special effects to achieve this? Or are we forced to create new weapons?

Dr. MURDOCK. I am not familiar enough with the classified details of how variable our variable yields are. There are a number of ideas that are out there. For example, when you talk about a primary-only weapon where they use just the fissionable aspect of it and not the thermonuclear one, they have suggested that that is a way of varying the yield of some of the largest warheads that we have on ballistic missile defenses during that time.

My belief is, is that when deterrence, when you are talking about deterring adversaries who are thinking about using nuclear weapons to deter you, you want to think about, well, what are the kind of capabilities I need to deter that?

And a new weapon indicates to the adversary that we are serious about this, that we are designing a weapon to counter his potential use of a nuclear weapon against us.

I personally don't have an allergy against new nuclear weapons. So there is a reason why, as I look to the future of the kind of capabilities we need, I think of the prescription of no new weapons and no new nuclear capabilities as a self-defeating one.

And so from a perspective of developing a deterrent that works, I don't think we should be bound by those kind of rules.

Mr. COOPER. Thank you, Mr. Chairman. I look forward to the next rounds of questions.

Mr. ROGERS. Thank the ranking member.

The Chair now recognizes the gentleman from Colorado, Mr. Lamborn, for 5 minutes.

Mr. LAMBORN. Thank you, Mr. Chairman, for having this hearing.

And thank you all for being here and for your hard work.

I would like to ask something to Dr. Clark Murdock, Dr. Keith Payne, and Mr. Elbridge Colby in particular.

There was some talk that there was consideration of further unilateral cuts beyond what New START [Strategic Arms Reduction Treaty] called for. And I am not sure that that has died down or not, I hope it has. But should that kind of talk be resurrected, would you or any of the three of you advocate for further unilateral cuts on the part of the U.S. of our nuclear stockpile?

Dr. PAYNE. I would not, sir.

Mr. COLBY. I would not, sir.

Dr. MURDOCK. No.

Mr. LAMBORN. Okay. Given the open sources that have reported that there could be cheating by the Russians on the INF [Intermediate-Range Nuclear Forces] Treaty, does that call into question on the parts of you three gentlemen, again, our adherence to the New START Treaty? And my thought is that we are handicapping ourselves in some ways through New START.

If it is reciprocated that is one thing, but if they are cheating in other areas, will it even be reciprocated? And should we continue handicapping ourselves? That is my question and I would like to get your perspective.

Dr. MURDOCK. My belief is that each of the agreements that we have reached with the Russians are separate agreements and that we should abide by an agreement that we have reached with them on New START unless there is clear evidence that they are not abiding by that same agreement on New START.

My belief is, is that I think there is pretty clear evidence that they have cheated on the INF Treaty, and I think that we have to think through how to respond to that in a way that is in the field of INF, and responds directly and proportionally, in some way, to the violation of that treaty.

It is not something that we should ignore, nor that we should deny that it existed.

I think we have to respond to it, but I would not respond to it by violating New START because, in part, that takes the onus off the Russians for violating arms control agreements that they have agreed to.

Dr. PAYNE. Yes, sir, I don't recommend withdrawing from the New START Treaty. I agree with Clark, we ought to look at these things individually. I do think that there are some options that we can take with regard to Russian violations of the INF Treaty, as you described, but withdrawing from the New START Treaty, I don't believe is one of them we should exercise.

But I will add that I think that it is possible that the Russians are not going to adhere to the New START Treaty. There have been a number of statements coming out of senior Russian officials setting, in a sense, the basis for not abiding by the New START Treaty limitations in 2018.

This is what they did with the INF Treaty in earlier parts of 2007, for example, where recently the former Secretary of Defense mentioned that the Russians had talked to him and indicated they were interested in withdrawing from the INF Treaty.

You do see Russian officials now sort of setting the same base for the New START Treaty. It doesn't mean they are going to withdraw from it. Doesn't mean that they are not going to abide by it. But I would at least keep in the back of my mind that they are now talking along those lines, and watch very carefully to see what they do.

Mr. COLBY. I pretty much agree with Dr. Payne, sir. I would say I think Russian violations of INF are extremely serious and require really concerted action. I am actually somewhat mystified why the administration is not more alarmed by this sense.

You know, I see arms control as a strategic tool, as a way that we can or may advance our interests in the world. And so if a country violates that, we can go back to not having it. But if you are committed to a world without nuclear weapons, you need to make sure that the treaties are sacrosanct. And yet, there doesn't seem to be a lot of concern, which mystifies me.

But it is very serious because of the military dimension. And there are, you know, when I spoke about these escalatory options, INF may give them potential there, so we really need to be putting pressure on them. I think at the very least we should be looking at R&D that is legal under the treaty, to see what our options are. Other kind of countervailing options should be looked at and talked about, at least in principle, openly.

And ultimately, we should make sure that the Russians bear the costs and the diplomatic and political costs of their violations and misbehavior.

At this time, I think, you know, we do benefit from New START in terms of predictability and some data exchange, that kind of thing. It is not, you know, it is not any kind of dramatic thing. And also it allows us to do the fundamental things that we need to do in terms of the modernization of our forces.

But if, as Dr. Payne mentions, we do detect Russian noncompliance or circumvention, we should look at that very, very carefully. And the Russians should understand if they violate or circumvent treaties that we will be prepared to call them on that and respond.

Mr. LAMBORN. All right. Thank you all.

Mr. ROGERS. Thank the gentleman.

The Chair now recognizes the gentleman, Mr. Aguilar, for 5 minutes.

Mr. AGUILAR. Thank you, Mr. Chairman.

Thank you for being here, gentlemen.

This one is for the group.

And as it was mentioned in the Wolfsthal and Lewis, the Trillion Dollar Triad report, Dr. Mount, you mentioned that in your testimony a few times, and the cost estimate of a trillion dollars to upgrade our nuclear triad over the next 30 years.

Based on this mind-boggling figure, how can we, regardless of the strategic argument, realistically talk about developing and deploying lower-yield weapons when clearly now and in the future some of these serious investments that we need to make, some seri-

ous investments in our conventional capabilities, with finite dollars available to us, it is imperative that they be invested wisely.

And I give you some credit because in your testimony you do talk about some of the financial implications as well. Can you expand on that?

Dr. MOUNT. Yes, thank you for that, Congressman. I would be glad to. It is important to realize that there is a bound in these estimates, anywhere between \$800 billion and \$1.1 trillion, depending on what you include and how you include potential figures for cost growth.

That having been said, I think it is important to realize that these funds are not likely to be appropriated in their entirety. And it is important to sort of plan ahead and allow the services to plan ahead and make sure they know what is coming so that they are not caught unawares with abrupt changes to nuclear force structure that are mandated by Congress.

I think it is important for the White House and the services to sort of together cultivate a plan to bring these modernization plans under control. And I outlined a couple of ways to do that.

It is important to realize that I think there are some areas where the modernization plans can be pared back without deleteriously impacting our ability to deter our adversaries or to respond to a wide range of conflicts.

So these include the new cruise missile I think we should take a serious look at, and also the large number of submarines that we are planning to build.

Now, that is not to say that we ought to throw the plans out the window. We will buy a new bomber, and we should. We will buy new submarines, and we should. And it is important to prioritize and protect appropriations for those systems that are critical to national deterrence and deterrence operations, while looking for areas that bring these modernization plans sort of back into the fold of reality.

Mr. AGUILAR. Anyone else?

Dr. BLECHMAN. I would just note that I think we are already seeing the effects of the greater burden of nuclear modernization on the budget. I noticed that in the \$5 billion reduction that was necessitated by the budget agreement, there were substantial cuts in Army readiness, which is not a choice that I would make.

I think far more important than the full extent of the nuclear modernization program is to ensure that our ground forces and other conventional forces are as ready and as capable as they might be.

Mr. AGUILAR. I think the chairman would also convey that that reduction to readiness was a reduction of the increase to readiness, which a lot of other members advocated for as well.

One additional point. Instead of—are any of you concerned about, you know, with the lower-yield weapon that we are discussing, you know, that this investment would give other countries more of a reason to invest in their own nuclear arsenals and maintaining this constant drumbeat of the arms race?

And some of you allude to that in your testimony, but would anyone like to expand on their concerns with respect to that point?

Mr. Colby and then Dr. Murdock.

Mr. COLBY. Sure. Thank you, Congressman, for your question. I think it is an important one. I mean, you know, in my statement I emphasize the need for change, but I also think that it is very important for the United States to appear and to act in a way that is responsible and kind of a good steward of its nuclear weapons.

But I think, Congressman, the main, you know, the main challenge to U.S. interests and to stability really is not so much from a kind of mimicking of what we do, but of a potential opening of vulnerability.

And I think the world is changing, our adversary, our potential adversaries, I should say, have been increasing their military budgets abundantly, both in the conventional and nuclear realm.

And I think if we don't respond, it is actually vulnerability creates an instability of its own. And that is what concerns me.

There are other universes. There is the world of the 1990s in which the problem was different. So I would not always say that this is the right course of action.

Dr. PAYNE. If I might go back to the cost question, just because I would like to add a point to that, and that is, the best study I have seen on cost has been done by CSBA [Center for Strategic and Budgetary Assessments], came out a few months ago.

What that study said is that the budget for nuclear modernization and recapitalization will range from 3 to 4.9 percent of DOD's budget, reaching a top of 4.9 percent in 2029. It then concluded that unless we talk about eliminating an entire leg of the triad, trying to find money in that budget is, and I quote—"the hunt for small potatoes."

And every study that is represented in this assessment that Dr. Murdock led calls for maintaining the triad, not eliminating the triad.

So I would suggest that, given the priority of nuclear deterrence and Secretary of Defense Ash Carter has said nuclear deterrence is DOD's first priority, that those types of cost structures obviously have to be managed well, but given that it is DOD's first priority to maintain a credible nuclear deterrent, it seems to me that the recapitalization is not going to be too expensive. It is a matter of will and it is a matter of priorities.

On the action/reaction question, sir, that you asked, the general notion, as you put it forward and as put forward frequently, is, if the United States goes forward with the type of capabilities that Bridge talked about or Clark talked about, that this might encourage, say, the Russian Federation to respond more in that direction as well.

Let me—

Mr. ROGERS. The gentleman's time has expired. I am going to have to—sorry. But I would ask you this. It is a very provocative question. Any of the witnesses that would be willing to provide us a response in writing, I would appreciate that for the record. That would be very helpful.

[The information referred to can be found in the Appendix on page 135.]

Mr. ROGERS. Let me try to keep us on schedule and go to Mr. Fleming, of Louisiana.

Mr. AGUILAR. Apologies, Mr. Chairman.

Mr. ROGERS. I am sorry?

Mr. AGUILAR. Apologies.

Mr. ROGERS. No, you asked a good question. That is why I appreciate it. I would like everybody to respond to it.

Mr. Fleming is recognized.

Dr. FLEMING. Thank you, Mr. Chairman.

And I am glad to hear, it is very interesting to hear that really a debate that is going on right in front of our eyes, the panel, of where we go with our nuclear deterrence. And I do appreciate the fact that it seems there is a consensus that we maintain our nuclear triad, and I certainly agree with that. We want to make our potential adversaries the most complex problem possible. That is how deterrence works.

Dr. Payne, I have a question for you. How do long-range bombers factor into your call for greater adaptability and flexibility in our future nuclear posture? And could you explain why we need the new Long-Range Strike Bomber that will eventually replace portions of our current bomber force?

Dr. PAYNE. Yes, I am very much in favor of both the new bomber and also the new cruise missile specifically because they contribute to the adaptability that I think is so important for deterrence.

To go back and set the stage, if we don't have a deterrent that can adapt to changing circumstances, we may have a deterrent that fails. And our most important priority is having a deterrent that does not fail to the extent that we can produce a deterrent that won't fail.

And having a bomber and the LRSO, the new cruise missile that would be with that bomber, allows the United States to be able to adapt to many different circumstances. It allows different options for the President to respond or to threaten to respond. It is just a key part of having an adaptable force structure.

Dr. FLEMING. Okay, thank you.

Mr. Colby and Dr. Murdock, can you give us a succinct and compelling case for why we need the Long-Range Strike Standoff weapon, the long-range bomber, which will replace our current air-launched cruise missile? Do you believe this is an important capability, and why or why not?

Mr. COLBY. I do, sir. And thank you for the question. I think at least two major factors. One is that stealth, which is the basis for the B-2 and low observability which will be the basis for the long-range penetrating bomber, are both, you know, it is a critical capability, but we don't know the future of it. We know our adversaries are making a lot of progress in detection and targeting of these weapons.

And even if we can still partially operate, there may be constraints on what we can do. So we want to have a backup option, we want to be able to penetrate, especially given the plenitude, the panoply of targets we may be going after.

The second and related point is a cost-imposition point. We want our adversary to have to prepare for a weapon with a totally different trajectory. And this is as true in the conventional realm as it is in the nuclear realm.

So I think, given the amounts we are talking about with the Long-Range Standoff option, it makes abundant sense.

And I also think, this is more of a rebuttal to some of the arguments that are out there, that this is not a destabilizing weapon. In fact, the United States traditional position was that cruise missiles were generally stabilizing. And we have been using conventional cruise missiles without incident, without somebody thinking it was the prelude to a nuclear attack, for 40 years.

You know, obviously if we use them in certain ways that we would, probably wouldn't do, we would want to be really careful about it. It would raise those kinds of questions. But I think that it is a bit of a canard.

Dr. FLEMING. Yes, Mr. Colby, do you have a—

Dr. MURDOCK. I think you asked the question of me. Mr. Colby spoke first.

Dr. FLEMING. Sorry, Dr. Murdock, yes.

Dr. MURDOCK. That is all right. I fully agree—

Dr. FLEMING. I can't see your nameplate so I am not sure who is who up there. Thank you.

[Laughter.]

Dr. MURDOCK. I fully agree and support the statements that Mr. Colby made at that time. I think the particular aspect is that it is a hedge against the failure of stealth. The B-52 has been our most reliable bomber platform for decades. It requires, it depends upon standoff weapons to survive, both conventionally and in nuclear mode.

And to me, to give up the flexibility, as Keith Payne would refer to, of having a standoff missile, a standoff penetrating missile, it is easier to penetrate with a missile than it is with an aircraft during that time, plus they are a lot cheaper when you are talking about the number of missiles you need versus the number of platforms you might need to penetrate with, that it is affordable.

And as Keith also pointed out, the CSBA study makes it clear, 30-, 35-year projection of \$1.1 trillion sounds like a lot. Well, military capability is expensive. It costs, you know a billion dollars a year just simply to operate a carrier and that is not even talking about buying it, just to operate a carrier. So these capabilities are very expensive.

But the issue, as the CSBA report points out, is, what is the priority of this? Can we afford to spend 5 percent of the U.S. defense budget on anything? Of course, we can. The question is, is that 5 percent more important than other competing priorities? And I would argue, when you are talking about a foundational capability like our deterrent, which is the bedrock of national power, we can afford that.

Dr. FLEMING. And I would agree. I mean, it is not only saving money through dividends, but it is saving lives through wars not fought. So I thank you.

And I yield back.

Mr. ROGERS. Thank the gentleman.

The Chair now recognizes the gentleman from California, Mr. Garamendi, for 5 minutes.

Mr. GARAMENDI. Chairman Rogers, thank you so very, very much.

This is an extraordinarily important policy issue. It is a policy that we will be dealing with, I think, in the next—this year and

on into probably the next 5 years. But we will set in place, one way or another, an extraordinarily important process.

We have heard from, what I would call, the advocates of a greater nuclear. I would like to have Dr. Blechman take about 3½ of my 5 minutes and come back with your arguments as to what you have heard here.

Dr. Blechman.

If you can pull that microphone down in front of you. There you go.

Dr. BLECHMAN. Yes, thank you. Well, my arguments are several fold. One, the idea that we can fight controlled nuclear wars is based on theology. It has never happened, no one knows what would happen once a nuclear weapon is used. And the notion that we can only match a nuclear weapon with a like kind of nuclear weapon is, to me, it is not based on any empirical fact, it is ideas. And they have their ideas and I have a different idea.

For example, if there were, say, a conventional conflict in Estonia, that NATO had built up its conventional forces there, the Russians intervened nonetheless, there was a big conventional war, the Russians facing conventional defeat used a nuclear weapon, the U.S. could respond with a nuclear weapon delivered by a B-1 bomber, which perhaps previously had been deployed to Europe, with a variable yield. And there is no reason to think, in my mind, that such a response would not be just as compelling as being able to respond with a tactical weapon delivered by a fighter jet.

In fact, I would have doubts as to whether the current tactical fighters would be able to penetrate the Russian air defenses to deliver that weapon, and also that the European crews would be authorized by their governments to deliver those weapons.

So I think we are much better off depending on our strategic forces. So that was a view shared by the former Air Force Chief of Staff General Schwartz, for example.

Mr. GARAMENDI. I thank you for that. I must say this is extraordinarily disturbing to me personally. I don't know if any of us have actually seen a nuclear explosion. I suppose we have seen films of it. It seems to me that if we really want to deter a tactical nuclear option that Russia might deploy we simply say you use it and you are history; you use a nuclear weapon in any form, in any circumstance, and you are history, we could certainly do that. We have plenty of nuclear weapons and delivery systems to accomplish that goal.

So if this is about deterrence, it seems to me a flat-out statement of our policy, use a nuclear weapon in a tactical mode or any other way and you are history, period, that is deterrence. I think that also happens to be the French view of it.

So why do we need to build all these new nuclear weapons? Once you start that process, it seems to me that we head down a road that is not particularly safe in any way, shape, or form.

Dr. Mount, would you like to take my remaining minute and 10 seconds and respond to the arguments on the other side of the table, which would be the right-hand side of the table?

Dr. MOUNT. I would be glad to. I don't want to put words in my colleague's mouth, but as I understand it the argument for new nu-

clear capabilities is that a threat to utilize a large nuclear weapon in sort of a limited war scenario would be incredible.

And I would dispute that, seriously. It is not clear to me that we would ever use a tactical nuclear weapon under any plausible circumstance. As Barry mentioned, delivering a tactical nuclear weapon through a tactical fighter has serious trouble. I don't know that we would authorize it. We couldn't be sure that it would reach its target in the right way.

And most importantly, as you mentioned, any use of a nuclear weapon would have enormous diplomatic costs and it would give any President very serious pause. And the fact that we would incur such massive diplomatic and strategic costs, while plausibly not sort of having any outcome on the military situation on the ground, in turn, decreases the credibility of a threat to use one of these weapons.

So I would seriously question whether they are needed in specific circumstances.

Mr. GARAMENDI. Mr. Chairman, I will take another 30 seconds.

It just seems to me that we really need to have a continuing and a full debate on this issue because we will be making decisions this year and on into the future, in fact we are doing so today with the Long-Range Strike Bomber and the cruise missile that goes presumably with it.

That is all part of this process, and it will lead us down a path that we need to understand what the implications of that path are. And the gentlemen here are certainly important in elucidating that path.

I thank you for the additional 40 seconds.

Mr. ROGERS. I thank the gentleman.

The Chair now recognizes the gentleman from Arizona, Mr. Franks, for 15—for 5 minutes.

Mr. FRANKS. For 15 minutes, that would be perfect.

Mr. ROGERS. You would like 15, though.

Mr. FRANKS. That is perfect, Mr. Chairman.

[Laughter.]

Mr. FRANKS. Gentlemen, thank you for being here. This is a discussion of profound gravity. And I find myself with the persuasion of the gentlemen, the first three on my left, simply because I believe it is important to be able to meet a potential enemy with whatever options may be necessary. And they do get a vote in the equation.

So Dr. Blechman, your recommended strategy makes a basic assumption that U.S. conventional military superiority will continue indefinitely. And I hope you are correct.

On the other hand, Mr. Colby's recommended strategy is based on an assumption that U.S. conventional superiority may not continue and that it is eroding fast in places like maritime Asia. And I think that reports and intelligence that I see seems to be on his side of the ledger, to say the least.

If it turns out Mr. Colby is correct, doesn't that make your recommended strategy and posture somewhat invalid?

Dr. BLECHMAN. Yes, sir, you are correct. If the U.S. does not maintain conventional superiority, then we would have to look at alternative strategies.

However, for my sins, I have worked on defense issues in Washington for 51 years now, and I have seen threats inflated at least three times over that period. Yes, Russia is making some progress, much less than China. And yes, China is making substantial progress.

But if you look at Chinese technological capabilities or the size of their forces, it doesn't compare to what the U.S. already has publicly and what we are building for the future.

Mr. FRANKS. Well, perhaps it is a situation at this point where, you know, just the leadership posture is responsible for some of the issues in the Ukraine and Crimea. But it seems to me like they are handling themselves, at least strategically, pretty wisely.

And it seems to me that you are recommending cuts in the U.S. nuclear force would be difficult if not impossible to reverse in the face of a growing peer threat.

And if you are wrong, I think we are imposing a limited response in U.S. nuclear capability. I think it is a dangerous direction to go in.

Mr. MURDOCK, part of your recommended strategy of structuring accordingly our deterrence and extended deterrence, you outlined both of these SDF [strategic deterrent force] and EDF [extended deterrent force]. And I wanted to draw your attention to your table on page 20 and the last category of massive ordnance penetrator being carried aboard a B-2A and a B-52H.

I know that this—part of the penetration capabilities is simply the velocity and the inertia involved. And given that these two platforms have wildly different airspeeds, can you help me understand that?

And I am hoping to get one more question in quickly here, if it is possible.

Dr. MURDOCK. The purpose of the chart was to show the relative destructive power of nuclear and conventional warheads largely on the nuclear side. But I included the largest conventional weapon in there so that the reader would recognize that the range is very great among nuclear weapons, but there is also quite a significant gap between nuclear weapons and the largest of conventional weapons.

Mr. FRANKS. Yes, it makes—

Dr. MURDOCK. In my mind, they are not substitutable. Politically, they are really not substitutable, but just even in the conventional fragmentation they are not.

Mr. FRANKS. I think that is extremely reasonable and couldn't agree with you more.

Dr. Colby, you mentioned, if I heard it right, that some of the different ways or some of the mid-range where you can incrementally escalate could include things of an EMP nature. And can you help us understand that a little bit better?

Mr. COLBY. Sure. Thanks, sir. Well, I think if we are talking about the adversary, EMP can be used in a very destructive way to basically negate or really undermine the U.S. ability to project power through destruction of electronics, space assets, and et cetera. So an EMP scenario is one that we do need to think very seriously about.

Mr. FRANKS. Do you have any suggestions?

Mr. COLBY. Well, sir, I think in this kind of context, you know, proportionality, you know, I don't think we should tie ourselves to being precisely proportionate, but having those kinds of responses to be able to demonstrate to a potential adversary that he can't make a move and leave us in a place where we don't have a sensible way to respond is a recommendation.

Mr. FRANKS. Mr. Chairman, I think the man makes a very important point.

I am sorry?

He makes a very important point and I think it is important that we don't maintain the kind of grid that is so vulnerable that it invites that scenario. So thank you very much.

Mr. ROGERS. Thank the gentleman.

The Chair now recognizes the gentleman, Mr. Bridenstine, for 5 minutes.

Mr. BRIDENSTINE. Thank you, Mr. Chairman.

Every day I am in Congress I am surprised, most recently by Mr. Garamendi, my good friend from California, who I have high regard for, who I think is a great thinker, although we might not always agree, if very often at all. I don't know.

But you know, his declaratory policy of if you use a nuclear weapon you are history, it is very Reaganesque and I am impressed by that. And I would—I say that very complimentary.

What I would like to discuss are some of the things that we have in common. The ranking member mentioned that the command and control element seemed to be an issue where there is a lot of commonality, which is very important for us because where there is commonality we can start looking at budgets, at policy, at programs that we can put together.

And when you look at the command and control, it seems like everybody is in agreement that we need resiliency, that we need survivability.

You know, we have, you know, a space-based architecture for command and control that would be survivable and resilient. There is an AOA [analysis of alternatives] that has been in the Pentagon now for a long time. We have been trying to get that from the Pentagon. It has been very difficult getting it.

But I wanted to draw on a statement from Mr. Colby. You recommend that the United States develop, quote—"more resilient space assets, more terrestrial and air-breathing platforms for C4ISR [command, control, communications, computers, intelligence, surveillance, and reconnaissance] and more modular and disaggregated architecture."

I think I would agree with all of that assessment. Can you describe specific investments you would support? And do we need a layered architecture to back up the current system?

Mr. COLBY. Well, thank you, Congressman. You know, I think this is actually a really important focus. I think it is one that crosses the aisle because it is vital for the survivability issue and it is also increasingly in jeopardy because of not just intent on the part of our potential adversaries, but the nature of technological change in the space, counter-space, cyber domain, and so forth.

I think disaggregating the architecture is one thing, making our space capabilities more survivable. But also potential things like

air-breathing, unmanned aerial systems or airborne platforms that can do relay so that if your space assets are vulnerable, as they may inevitably be to some degree, to some earnest ASAT [antisatellite weapon] attack, then we have other options.

Also, you know, we can look at a wide variety of different options. I don't have a particular set of A, B, C, D in terms of recommendations.

But actually, it is funny you mentioned something I am thinking about right now, so it is good to hear because I will redouble in my efforts to think it through.

Mr. BRIDENSTINE. Well, thank you.

Dr. Blechman, one of the things I am interested in that you recommended is that the United States develop low-cost space-launch capabilities to help with reconstitution. Can you describe how this committee might be helpful in those low-cost, what are the investments that might be necessary to get low-cost, space-launch capabilities?

Dr. BLECHMAN. Well, I think this is an area where our commercial, where our private sector can make the largest contribution. And we are seeing increasing competition for developing space-launch capabilities in the private sector. And this committee can encourage the Air Force and the Department of Defense to open competition for launching satellites.

There has been some limitations placed on that in the past. And things are changing a little bit, but they can be encouraged to move more quickly so that these companies have the incentives to invest their own funds and to push their technologies as fast as they can.

Mr. BRIDENSTINE. So in my last minute, I have a provocative question that might make my colleague from California upset with me.

Mr. GARAMENDI. Who will give me 15 seconds?

Mr. BRIDENSTINE. The Comprehensive [Nuclear] Test-Ban Treaty is something that Secretary Kerry has been pushing for the Senate to ratify historically. And I think there are very challenging implications if we were to go that direction.

And I was wondering if I could hear from Mr. Colby, Dr. Murdock, and Dr. Payne. I have got 30 seconds remaining, so maybe I can take that for the record.

But Dr. Murdock, would you be willing to take that question? The implications if we go forward with a Comprehensive Test-Ban Treaty, and instead of testing we rely on, I guess, computer models?

Dr. MURDOCK. Well, the computer model that you refer to, a science-based stockpile stewardship program, it has actually greatly enhanced our understanding of how nuclear weapons actually function.

And while there was a considerable amount of controversy at the outset of that program, there is very little controversy now that in the scientific community when it comes to our ability to certify whether nuclear weapons will work.

There is a question in terms of my bias, my recommendation for developing new capabilities and new weapons with those that you will be departing from the experiential record of previous nuclear

weapons and that will raise a question, again, the issue of, do you need to test a weapon in order to be sure that it works?

Nuclear weapons have been employed twice; one of them had been tested before and one of them had not, and they both worked. Now we are in an age of considerably greater sophistication than the first two nuclear weapons and so I think as we go into the 2025 and beyond, the issue of developing and having confidence in the reliability of nuclear weapons that you develop to deal with new security challenges would make, in my mind, ratifying the Comprehensive Test-Ban Treaty now unwise.

Mr. ROGERS. The gentleman's time is expired.

Thank you very much.

Dr. Blechman, you suggest that we allow several hundred U.S. tactical nuclear weapons we have, our B61 nuclear bombs, to simply age out and go away, that we shouldn't modernize them.

But it is openly discussed that Russia has many thousands of tactical and nuclear weapons, landmines and air defense missiles, artillery shells and many other types.

We eliminated our other forms of tactical nuclear weapons in the 1990s, but Russia didn't follow suit. And now Russia is violating the INF Treaty with ground-launched cruise missiles.

So isn't your proposal simply unilateral nuclear disarmament by the United States, something we tried in the 1990s and have direct evidence that it didn't work?

Dr. BLECHMAN. Well, let me say first that I do think we need to respond strongly to the Russian violation of the INF Treaty, not by doing anything to violate the START agreement, but I think it is essential that they be held to account to treaties that they are parties do.

On the question of eliminating the tactical weapons, I don't believe that the European allies are likely to authorize their crews to be the first ones to deliver a nuclear weapon in the event the Russians use a nuclear weapon in a conflict in Eastern Europe. I think we can get ourselves in a terrible political bind in such a situation.

Now, I believe we should depend on our strategic forces, our long-range bomber, and I certainly support the new long-range bomber as a very high priority, and we can deliver the B61 bomb which has a variable yield with the long-range bomber perhaps based forward in Europe, but not necessarily, and be much more confident that, one, it would penetrate the Russian air defenses and, two, that the political decision would be made in that situation.

Mr. ROGERS. Great. You also suggested eliminating one-third of our ICBMs [intercontinental ballistic missiles] and eliminating two SSBNs, which means we cannot sustain our continuous at-sea deterrence. With Russia totally uninterested in following such reductions, aren't those dangerous positions?

Dr. BLECHMAN. I don't believe so. I think that we have more than enough weapons to deter a Russian attack on the United States or on any of our allies. I think we can go down to, I don't know what the number is, 1,200, 1,000, weapons and still have more than enough destructive capability that the Russians would be crazy to attack us or our allies.

I think deterrence depends lots more on demonstration of political will and leadership and on the conventional forces and the knowledge of the adversary that if they take a threatened action they will confront American military forces and allied military forces on the ground. That is what I think deterrence depends on.

Mr. ROGERS. All right.

Dr. Payne, the final report of the Perry-Schlesinger commission on the strategic posture of the United States stated, quote—"Working with partners in the intelligence community, the laboratories should be in a position to advise national leadership on foreign nuclear weapons' activities bearing on the interests of the United States and its allies. In short, the commission recommends that the laboratories be allowed to design, simulate and experimentally assess foreign nuclear weapons designs for the purposes of defense analysis," close quote.

Why, in your opinion, is this important?

Dr. PAYNE. Sir, it is important because—

Mr. ROGERS. Your microphone.

Dr. PAYNE. It is important because we need to know what types of capabilities other folks may be developing. And if our labs don't have the ability to try and replicate designs and look at those capabilities, we may not be very familiar with the type of capability that Russia is deploying or China is deploying. And ignorance at that level could be profoundly dangerous.

So I think it is extremely important that our labs be able to have that capability to go look at foreign systems, see how they are designed, understand those foreign systems in every way possible so that we are smart about what our opponents have and not dumb.

Mr. ROGERS. Anybody else have any thoughts as to why that is important or not important?

Let the record reflect, no.

I now turn to the ranking member for any final questions he may have.

Mr. COOPER. Thank you, Mr. Chairman.

It is a fascinating and terrifying debate and words like "discriminate" and "proportional" sound so good and they are used in this debate to possibly have a whole new class of weapons that we thought we had discarded decades ago.

And it certainly gives you an advantage over the others who could then be alleged to favor indiscriminate and disproportional responses.

But I wonder, in a nuclear exchange, how good are we at knowing what in fact has happened? Like could an adversary think a low-yield weapon that we are so proud of because it was discriminate and proportional was in fact a dud? And how do you know? And I know there are seismic detectors and there are lots of ways to kind of tell. But in the panic of war, the fog of war, who really knows, and the world's fate could hang in the balance.

So when Mr. Colby advocates switching out D5s for primary-only missiles or, you know, dialing these things down to variable yield so presumably we get in Mr. Murdock's sweet spot of between MOPs and, you know .3 kiloton, like, that is—I don't know, how do people know this?

Dr. PAYNE. I think, as you said, sir, the fog of war does not allow us to promise what you are going to know or not know. The question, though, in my mind is, does that mean that you don't prepare to have the type of options that Clark and Bridge have suggested? Because if you don't prepare to have those types of options, it is a self-fulfilling prophecy. All you are going to have are the type of large nuclear options that cause potentially much more damage than anybody would think reasonable under a circumstance.

And again, I am not talking about the employment of nuclear weapons, I am talking about the importance of having those capabilities to deter the opponent.

You know, Churchill said, no matter how mature you are in your sophistication, every now and then you should take the enemy into account. And let me just suggest, if you take the enemy into account in this very discussion, what we know from a number of open Russian sources, I am not saying anything here that isn't available in the Russian press, is that the Russian military has said they are going in the direction, they have gone in the direction that both Bridge and Clark have talked about, because they see that as a way of getting under the horizon of the U.S. nuclear deterrent.

This isn't us just coming up with this stuff. The Russians have said that that is the kind of deterrent they want to have because it beats our deterrent strategy.

And so what we are suggesting is we want the capabilities to fill in the blanks, not because we want to use them, but we want to make sure that the Russians know that use is not an option for them, so that deterrence works.

That is the argument that you have heard from this left side of the table, from your perspective.

Mr. COOPER. Preparation is a very seductive argument. And I as a Boy Scout, an Eagle Scout, am all for being prepared. But capability can translate into survival, it can also translate into temptation. You know, you build a series of perfect hammers, then you are going to use that hammer and every problem will start looking like a nail.

And it is interesting how many times Russia has come up in the discussion, because in terms of population Pakistan is now larger and may be a less predictable nuclear power, but we like to demonize; Dr. Blechman pointed out three times in his career, we have exaggerated the capabilities of different enemy categories.

It is really important we get this right.

Mr. COLBY. If I—

Mr. COOPER. Yes.

Mr. COLBY. Could I comment, Congressman? Because I think it is a very important question. And honestly, I think it is a—I mean, look, these are horrible weapons that could kill untold numbers of people. I mean, they are the absolute catastrophic weapon and so they need to be treated with the utmost seriousness.

And I certainly don't come here and recommend this lightly. But I think and I particularly say I don't think we should be thinking about escalation control or escalation dominance. We are thinking about an inherently risky and potentially catastrophic endeavor. But as Dr. Payne points out, we don't really have a choice.

At a grand strategic level, we extend deterrence to countries around the world, over 30 countries, including ones where we are conventionally vulnerable to a nuclear-armed adversary with serious conventional forces that he can use very rapidly and who has evinced the willingness to use them.

And so we have to have a way to fight wars and defend these countries in ways that are not suicidal. And with respect, Congressman, I think the problem with that strategy that your declaratory policy is, first of all, it is not credible, the guy is not going to believe it and it may even invite a challenge because he really won't believe that we will follow through on it and it will be a way to puncture our credibility.

And I am struck by a famous example that was in Fred Kempe's book on "Berlin 1961" where there is actually a debate in the central committee of the communist party in Moscow about the percentage of probability of whether nuclear war would result if they pushed the ball forward in Berlin.

And Mikoyan, the defense minister, was saying it is 10 percent, we shouldn't do it. And Khrushchev says, no, it is something more like 5 percent so we can do it. So people gamble even under the nuclear shadow.

And I think that if an adversary can say, hey, I can see a way where, yes, I am going to take risk on, but I am going to be willing to do it anyway, the Arabs, the Egyptians and the Syrians invaded Israel in 1973, which they knew was very dangerous potentially, but they did. And so I think what I say to you, Congressman Cooper, is absolutely, we need to be restrained, we need to be serious, we need to be sober about this.

But I think that if, you know, the problem here is not that we are going to invent these and use them. I think the problem here is that we are potentially leaving open gaps that create vulnerabilities that can actually spur the ambition of people like Vladimir Putin.

Dr. MOUNT. Congressman, if I might comment. I think it is exactly right to say that we ought to prepare for this new era of strategic competition. I think that it is vital to do so. But I think in shifting the bounds of this competition into the nuclear domain, you legitimize Vladimir Putin's reckless movement of nuclear capabilities and his sort of—and his very reckless risk-taking.

I think it is vital that the United States and its allies prepare to counter these hybrid strategies in the domain where they started, so we prepare robust, layered, conventional responses so that we can combat these strategies with strategies of our own that actually have a plausible chance of stopping this kind of aggression on the ground where it starts.

I think we have every interest in maintaining a resolute and unified response to Russian aggression at those levels and no interest at all in allowing Russia to shift the game to the strategic area where he is more capable, relatively more capable.

Mr. COOPER. Well, we need to make sure we don't mistake nationalist bluster for serious intent, and when you are leading a nation that is declining in population, has a problem with alcoholism, you have to use extraordinary measures to try to be popular in a country like that.

I am in no way defending Mr. Putin. But it is so important that we get this right. A copycat approach, a monkey-see, monkey-do approach could well be what they are most interested in when so often we have been on the short end of asymmetric warfare.

It seems to me that the ideal response is not a proportional one, but a hugely worse one, but nonlethal. You know, it is amazing what the capabilities of the militaries are and the capabilities of warfighting, not just nuclear-nuclear.

So I hope that we will be able to explore these issues. I appreciate Dr. Murdock leading this very interesting study and getting the debate going again because it has been too long since we have had one like this. And it is very important that the members of this committee and the Congress be more versed in these issues.

And the final point would be, Dr. Blechman's, we have heard a lot of hawkish comments today. But as the National Journal reminds us today, we are about to pass a defense bill that uses pay-fors that are, quote—"almost universally regarded as gimmicky." That is a real sign of a national strength. That is a real sign of commitment.

And everybody talks tough, but you have got to be able to pay the bills. And when we are borrowing so much of this money from China to do this, it has a certain ironic touch.

So Dr. Murdock's entirely right. We can pay for this if we have the will to do it. It is a very small percentage of our defense budget. But we haven't been paying for our defense budget. And it goes without saying what our NATO allies have done to shirk their responsibilities. You know, they enjoy our umbrella, but they don't want to pay the bills either.

So we have serious issues in the West of willpower and determination. And I hope that debates like this can not only focus on the technical, military aspects, but also the social aspects that are required to have a genuinely strong defense.

Thank you, Mr. Chairman.

Mr. ROGERS. The Chair now recognizes the gentleman from California for a final set of questions.

Mr. GARAMENDI. Thank you, Mr. Chairman.

And once again, thank you for this extraordinarily important discussion and debate which will go on for a long time.

My concern here is that the advocates of advancing our nuclear forces basically put us down a path where we would be developing multiple delivery systems and multiple weapons on those systems, all of which would enable us to engage in a limited nuclear war. And I think that is exactly where this would go, presumably for the purposes of deterrence.

Now, if that is where we want to go to be able to wage a limited nuclear war, then we will make those investments.

On the other hand, if our goal is deterrence, that is to not have anybody use a nuclear weapon, either in a tactical way or in a strategic way, which is a kind of a, in my mind, a foolish dichotomy, but nonetheless if that is our goal, then is there another way of achieving it? And I guess I laid out another way of achieving it. You use a weapon, then you are history. I mean, that is a deterrence.

Are we willing to do it? Which Mr. Colby suggested perhaps we would not be. Well, time will tell. Hopefully, we will not have to pass time to find out if there is going to be a moment of truth.

But it just seems to me extremely dangerous to accept the path that we will create new delivery and new weapons for the purposes of engaging in a limited nuclear war, which I think the three of you are suggesting we should be prepared to do.

On the other hand, there is the—what seems to have almost been forgotten is that we have made extraordinary progress in limiting nuclear weapons. There is no doubt that we have gone from several tens of thousands to significantly less than that, probably less than 10,000.

Yes, Russia does have a lot of tactical nuclear weapons. But is there a possibility that they would use them in Estonia? Now, if NATO decides to invade Russia, that is another matter. Would Russia use it in that case? Well, I am sure they would. But then why are we invading Russia? Well, why is NATO invading Russia? Or maybe it is China and Russia going at this, I don't know.

But it just seems to me that we need to be very, very thoughtful here before we accept the policy that the United States is going to develop a series of tactical nuclear weapons for the purposes of engaging in a limited nuclear war.

All right. Is that really what we want to do? And is there such a thing as a limited nuclear war? I think there isn't.

Now, it may be that the first nuclear war is limited, but the next one and the next one and the next one?

There has been a policy for some years now that nuclear weapons are off the table for war. They are on the table for deterrence for sure. And I think that is good and I think they ought to be there. Now, what does it take for us to maintain a reasonable deterrence?

So I would like to see this in two—I see it in two different ways. One, advocacy for the ability of the United States to create the ability to engage in a limited nuclear war presumably for deterrence of a limited nuclear war. And the other is the traditional deterrence that we have had for more than 50 years.

I am deeply concerned that this nation would lead us and the world down the path that we would develop the capability to engage in a limited nuclear war. I don't want us to go there. I think it is extremely dangerous.

So with that, I yield back and—

Mr. ROGERS. I thank the gentleman.

And I thank the witnesses for being here, for a very thought-provoking hearing. It has been very worthwhile.

I would remind you that we are going to leave the record open for 10 days for members who couldn't be here, to get their questions submitted to you. And I would ask you to respond to those in writing in a timely fashion if you could.

With that, we are adjourned.

[Whereupon, at 5:09 p.m., the subcommittee was adjourned.]

A P P E N D I X

NOVEMBER 3, 2015

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

NOVEMBER 3, 2015

Opening Remarks – As Prepared for Delivery

**The Honorable Mike Rogers
Chairman, Subcommittee on Strategic Forces
House Armed Services Committee**

**Hearing on “Future Options for the U.S. Nuclear Deterrent – Views from
Project Atom”**

November 3, 2015

Good afternoon. The subcommittee will come to order.

Welcome to our hearing on *Future Options for the U.S. Nuclear Deterrent: Views from Project Atom*.

For those who haven’t yet read it, Project Atom is a unique and very timely study on the future of U.S. nuclear deterrence.

It is *unique* because it brings together perspectives from across the policy and political spectrum to examine this most important of national security issues. Four different think-tanks participated and had what appears to be a spirited debate of the critical issues.

And Project Atom is *timely* because it is so sorely-needed. As some of the materials for the study say, it helps fill: “the current deficit in national security attention paid to the continued relevance and importance of U.S. nuclear strategy and force posture.”

This committee has been striving to correct this deficit as well. And we welcome Project Atom and its contributing authors in support of that cause.

Chairman Thornberry’s “Nuclear Deterrence Week” of hearings and classified briefings this summer was a step along that same path.

This subcommittee will continue our work to inform Congress and the public on the requirements for robust and credible nuclear deterrence long into the future.

My hope is that Congress and the Executive Branch—particularly the next Administration—will take a hard look at Project Atom and what it is trying to tell us.

Because the bottom-line is that the world is not standing still. We are *not* returning to the Cold War—but we are also *not* returning to the 1990s when so many believed international peace and love would reign indefinitely.

We need a clear-eyed view of the world’s other nuclear states—and would-be nuclear states—and what we must do to ensure nuclear deterrence holds and nonproliferation prevails.

In the short-term, we need to focus on building a nuclear strategy, posture, and enterprise that is flexible and responsive. Our witnesses have lots of suggestions on that front, and this committee has advanced legislation towards that goal.

In the longer-term, I believe we need to rethink the logic behind a policy that keeps the United States indefinitely maintaining the nuclear capabilities we had in 1990.

As other nations—Russia, China, North Korea, Pakistan—continue to research and deploy new nuclear capabilities over the coming decades, the logical question we must ask is this: “Will the nuclear deterrence capabilities the United States had in 1990 still be credible in 2040?”

Unless you believe global zero is going to happen any day now—and if you do then I have a bridge to sell you—we’re going to have to reexamine this policy.

A choice will be made on this front—not right now, but sometime in the coming years.

In the meantime, we can discuss all of this with our panel of witnesses. Thank you for being here today and for contributing to this study. We know it takes time to prepare for these hearings, and we appreciate it. Our witnesses are:

- **Dr. Clark Murdock**
Senior Advisor
Center for Strategic and International Studies
- **Dr. Keith Payne**
Professor and Department Head
Missouri State University
- **Mr. Elbridge Colby**
Robert M. Gates Senior Fellow
Center for a New American Security
- **Dr. Barry Blechman**
Co-Founder
The Stimson Center
- **Dr. Adam Mount**
Independent Consultant

With that, let me turn to our ranking member for any statement he would like to make.

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**Opening Statement of Rep. Jim Cooper
HASC Strategic Forces Subcommittee
Nov. 3, 2015**

Thank you, Mr. Chairman, for holding this important hearing on Project Atom. I look forward to the witness's testimony.

As we maintain America's nuclear deterrence and the West's extended deterrence, it is important for Congress to update our views on today's and tomorrow's threats as well as our plans for addressing those threats. Project Atom is a very timely and productive beginning for that discussion.

It is important that we include the public in these discussions. Already we are asking taxpayers for about \$35 billion annually just to maintain our nuclear weapons capabilities, and we may need to spend more than that. Our nuclear weapons infrastructure is aging, frail, and slow. We are losing the generation of experts who had the expertise to design and build the weapons that we and our allies rely on. These figures do not count the new delivery systems that will easily cost \$1 trillion over time.

Meanwhile, a few nations are talking, and sometimes acting, with increasing belligerence. Russian interest in "escalatory dominance" is particularly worrisome since no one can say for certain where the first use of a nuclear weapon, large or small, would lead. The threat of proliferation seems to increase with terrorism and non-state threats.

If history is any guide, it is hard to have public discussions of nuclear weapons without excess emotion. These are vital, even existential issues, to be sure, but must be managed with much more care than anything else that government does. Failure is not an option. The whole world is watching, and praying, that we choose wisely.



**Statement before the
House Armed Services Committee
Subcommittee on Strategic Forces**

***“FUTURE OPTIONS FOR THE U.S. NUCLEAR
DETERRENT – VIEWS FROM PROJECT
ATOM”***

A Testimony by:

Dr. Clark A. Murdock

Senior Adviser, International Security Program
Center for Strategic and International Studies (CSIS)

November 3, 2015

2118 Rayburn House Office Building

Chairman Rogers, Ranking Member Cooper, and distinguished members of the committee, I appreciate the opportunity to testify before you today. The scope of this hearing—to discuss the future options for the US nuclear deterrent as explored in our Project Atom report—is one I find both important and timely. Today, I will briefly describe Project Atom's methodological approach and present my principal recommendations for addressing the current deficit in national security attention paid to the continue relevance and importance of U.S. nuclear strategy and force posture and end by allowing the think tank team leaders to speak for themselves.

The object of the Project Atom study effort, which was made possible by the Smith-Richardson Foundation, was to conduct a zero-based, "blue-sky" review of U.S. nuclear strategy and force posture in the 2025-2050 time period. The CSIS study team took a competitive strategies approach and recruited three independent think tank teams -- the Stimson Center, the Center for a New American Security and the National Institute for Public Policy (NIPP) -- to participate and whose representatives are here today. The final report, entitled *Project Atom: A Competitive Strategies Approach to Defining U.S. Nuclear Strategy and Posture for 2025-2050*, was released by the International Security Program (ISP) of the Center for Strategic and International Studies (CSIS) in May 2015 and has been entered into the record in its entirety.

Project Atom -- Methodological Approach

This analytic effort, conducted by the CSIS study team and the independent think teams, was unconstrained by current strategy (e.g., reducing the role of nuclear weapons in U.S. strategy) and by current policy (e.g., the prohibition against new nuclear weapons or new nuclear capabilities). However, the analysis was conducted within a common framework that was developed in a series of working group meetings consisting of outside experts, think tank team participants and the CSIS study team:

- The CSIS study team drafted papers on the future security environment (both the 2030+ "Likely Future" and several "Alternative Worlds"), technological possibilities for nuclear weapons in 2025-2050 and possible adversary nuclear strategies. Once revised after working group discussion, these papers formed the basis for the "framing assumptions" for the think tank papers and included in the final report as appendices.
- Each think tank presented a detailed statement of its views, which were reviewed a daylong working group session and are also included in the final report as appendices.

As the Project Atom study director, I drafted a recommended nuclear strategy and posture, which represented my best judgment and was not intended to integrate or synthesize the think tank papers, reviewed it with the working group and consulted with additional experts as I drafted the final report. Although I found the competitive strategies approach utilizing external (to CSIS) think tank teams and experts extremely helpful and I am grateful for their participation in the study effort, I am solely responsible for the views expressed in the main text of the final report and those I present here today.

Preparing for a More Proliferated World

My views on the 2030+ "Likely Future" were considerably more pessimistic than several other Project Atom participants and led me to adopt an "assumed future" as the basis for the recommended 2025-2050 U.S. nuclear strategy and posture. My "assumed future" is based on two propositions:

1. The dynamics of the 2025-2050 security environment will cause further nuclear proliferation -- perhaps not to the 18 nuclear powers envisioned in an alternative future, but higher than the projected 9-to-11 nuclear powers (the current nine plus Iran and Saudi Arabia).
2. The credibility of U.S. extended nuclear deterrence, as well as the assurance that U.S. allies and friends derive from it, will decline significantly, in part because of the failure to prevent further nuclear proliferation.

A major stimulus for a faster rate of nuclear proliferation is U.S. conventional superiority. This causes non-nuclear nation-states (such as North Korea, Iran, Iraq, Syria and Libya) to pursue nuclear weapons as a counter or offset to U.S. military prowess. It also leads nuclear-armed states with interests in opposition to the United States (Russia, for sure, and perhaps China) to increase their reliance on nuclear weapons, much in way that the United States did to offset Warsaw Pact conventional superiority in the 1950s. The value of nuclear weapons as a "trump card" for negating U.S. conventional power was enhanced by the U.S. invasion of Iraq in 2003 to prevent Saddam Hussein from acquiring nuclear weapons. If the United States evidently believes that it could have been deterred by a nuclear-armed Iraq, why would a non-nuclear "regional rogue" not want one?

More nuclear-armed regional adversaries (to the U.S. and its allies) and increased reliance on nuclear weapons by major powers in competition with the United States will lead U.S. non-nuclear allies to want more, not less, U.S. extended nuclear deterrence and assurance. However, the credibility of those American security commitments, both to its adversaries and its allies, will have been eroded by the same factors that had led to the increased demand, namely the failure to prevent further proliferation. It is my belief that if the United States makes plans today for a more highly proliferated world in the future, it improves its preparedness for a world that could happen but makes it less likely that nuclear proliferation in the Middle East, which I take as given, will spread to Northeast Asia, Europe and elsewhere. This may seem paradoxical, to be sure, but paradoxes seem to be endemic to any nuclear age.

New Nuclear Weapons Needed for Recommended "Measured Response" Strategy

In "the second nuclear age," potential U.S. adversaries are thinking through how they might actually employ a nuclear weapon, both early in a conflict and in a discriminate manner, to get the United States to "back off" in a conflict. U.S. nuclear forces were designed for a global conflict involving the exchange of thousands of high-yield weapons, not limited exchanges of

low-yield weapons. Since most U.S. nuclear response options are large, "dirty," and inflict significant collateral damage, the United States might be "self-deterred" and not respond "in kind" to discriminate nuclear attacks. The United States needs discriminate nuclear options at all rungs of the nuclear escalation ladder to make the nuclear option unattractive to its opponents.

"Coupling" U.S. security to the security of its allies was always a huge challenge during the Cold War. Although U.S. nuclear strategy changed from massive retaliation to flexible response, it was the presence of 7,000 U.S. nuclear weapons in Europe that ensured that any major conflict in the European region would escalate rapidly to nuclear war. In a similar manner, the U.S. deployed almost a thousand nuclear weapons on the Korean peninsula (and about 3,000 non-strategic weapons in the Pacific region) to underwrite extended nuclear deterrence there. At a time when the Soviet Union posed an urgent, existential threat, forward-deployed U.S. nuclear weapons, along with over 300,000 troops, encircled "the East" and kept the Cold War cold.

The nuclear strategy being recommended here is called "Measured Response." This is not a new strategy; it is grounded in the U.S. strategy of escalation control that evolved as the U.S. adopted its flexible response strategy. It's about ensuring that there are no gaps in U.S. nuclear response options that would prevent it from retaliating proportionately to any employment of a nuclear weapon against the United States and its allies. U.S. conventional superiority lowers the nuclear threshold because it tempts conventionally weaker adversaries to an early (rather than as a last resort) employment of a nuclear weapon in order to avoid adverse results at the conventional level. By having a robust set of proportionate nuclear responses, the United States raises the nuclear threshold by reducing the attractiveness of nuclear escalation to its opponents.¹

As it shapes its nuclear forces for coping with 2025-2050 realities, the United States need to address its inferiority (with Russia) in non-strategic nuclear forces (NSNF, but also known as "tactical nuclear weapons" or TNWs) by developing a robust set of discriminate nuclear options and forward-deployable nuclear weapons. Deterring regional adversaries from "going nuclear" requires credible nuclear responses to their nuclear attack options. Forward deploying a robust set of discriminate nuclear response options conveys the message that the United States will "respond in kind" and proportionately to nuclear attacks upon its allies. The credibility of that message is reinforced because the U.S. homeland would not be engaged in the U.S. response to a nuclear attack on a regional ally, which leaves the burden on the regional aggressor to escalate to the level of "homeland exchanges." The price, however, for this more credible U.S. "nuclear umbrella," is the ally's willingness to host U.S. nuclear weapons. This is what constitutes "nuclear burden sharing" in 2025-2050.

¹ It should be noted that this Measured Response nuclear strategy meets a requirement established in current defense strategy. The *2014 Quadrennial Defense Review Report* states: "Our nuclear deterrence is the ultimate protection against a nuclear attack on the United States, and through extended deterrence, it also serves to reassure our distant allies of their security against regional aggression. It also supports our ability to project power by communicating to potential nuclear-armed adversaries that they cannot escalate their way out of failed conventional aggression."

The two primary missions for U.S. nuclear weapons are deterrence and extended deterrence, and the future force should be structured accordingly. In order to execute its Measured Response strategy, the nuclear forces both for deterrence and extended deterrence should have low-yield, special-effects (low collateral damage, enhanced radiation, earth penetration, electromagnetic pulse, and others as technology advances) options that can respond proportionately at the lower end of the nuclear continuum.

U.S. nuclear forces at the strategic level consist of *Ohio*-replacement class submarines, Minuteman III ICBMs (or a follow-on ground-based strategic deterrent [GBSD]) and B-52s and B-2s (and a new nuclear-capable bomber at some point), is the highly survivable, assured destruction force that is the foundation on which U.S. nuclear deterrence (and national power, for that matter) resides. This is the "strategic triad" that deterred the Soviet Union during the Cold War and it provides the United States with its "nuclear shadow."

- Discriminate employment options, delivered both by gravity bombs and a new cruise missile, would be provided by the same suite of air-delivered discriminate warheads used for extended deterrence.

U.S. nuclear forces at the extended deterrence level consist of forward-based and rapidly deployable dual-capable aircraft that would enable both permanent and temporary "coupling" of the U.S. nuclear deterrent to host-nation security.

- Dual-capable F-35As (based on land) and F-35Cs (based on carriers) would provide visible manifestations of U.S. extended deterrence and allied burden sharing.
- Discriminate employment options would be provided by a suite of low-yield, special-effects warheads, including possibly a smaller, shorter-range cruise missile that could be delivered by F-35s.

In this recommended 2025-2050 nuclear postures, bombers serve as an all-purpose hedge force that can enable, complement, and hedge for the three "legs" (SLBMs, ICBMs and F-35s). They provide extended-deterrence presence and discriminate nuclear options in regions where there are no forward-based or deployed F-35s. They can also provide weapons and mobility to deploying F-35As. In its traditional role as the first member of the strategic triad, bombers are the most flexible leg and can be used for signaling.

The time frame 2025-2050 is too far into the future to project specific numbers. However, the following are offered as guidelines for sizing the future U.S. nuclear force:

- Maintain rough parity with Russia.
- Maintain nuclear superiority over China.

- Maintain sufficient capability to cope simultaneously with nuclear-armed "regional rogues."
- Maintain a smaller stockpile, which is enabled by a responsive infrastructure.

The capabilities envisioned for this recommended nuclear posture include weapons intended to deter discriminate nuclear attacks at the lower end of the nuclear continuum; forward-based and forward-deployable delivery systems intended for extended deterrence, and assured destruction weapons that have intercontinental range, larger payloads, and are deployed in numbers sufficient to ensure stability and survivability. These are the right capabilities for nuclear deterrence in the twenty-first century because they counter the "nuclear offset" that U.S. adversaries might adopt for coping with U.S. conventional superiority.

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Clark Murdock is senior adviser of the International Security Program at CSIS. Joining CSIS in January 2001, Murdock has completed studies on a wide range of defense and national security issues, including strategic planning, defense policy and governance, and U.S. nuclear weapons strategy and policy. He directed the four-phase study on Defense Department reform, *Beyond Goldwater-Nichols: USG and Defense Reform for a New Strategic Era*, which released reports in 2004, 2005, 2006, and 2008. Murdock is currently leading several “track two” dialogues on nuclear policy issues—one involving the United States, United Kingdom, and France, and the other involving the United States, South Korea, and Japan. He has also recently completed studies on methodological approaches to building force-planning constructs and on nuclear posture implications of U.S. extended deterrence and assurance. He is the principal author of *Improving the Practice of National Security Strategy: A New Approach for the Post-Cold War World* (CSIS, 2004) and *The Department of Defense and the Nuclear Mission in the 21st Century* (CSIS, 2008). He also coauthored *Revitalizing the US. Nuclear Deterrent* (CSIS, 2002) and *Nuclear Weapons in 21st Century US. National Security* (MAS, 2008).

Before joining CSIS, Murdock taught military strategy, the national security process, and military innovation at the National War College. Prior to that, from 1995 to 2000, he served in the Office of the Air Force Chief of Staff, where, as deputy special assistant to the chief for long range planning, he helped develop a strategic vision for the 2020 Air Force. Then, as deputy director for strategic planning, he institutionalized the Air Force's strategic planning process and spearheaded the development of new planning products. Before joining the Air Force Chief of Staff's Office, he was special assistant to the under secretary of the Air Force, providing analytic support to the secretary and under secretary on broad issues of concern, including the future of air power and Air Force missions. Before joining the Air Force, Murdock served in the Department of Defense, where he headed the Policy Planning Staff in the Office of the Under Secretary of Defense for Policy and held responsibility for mid- to long-range analysis and planning on strategy and defense policy issues. Prior to joining the Department of Defense, he served for several years on the House Armed Services Committee as a professional staff member and as a senior policy adviser to then-Chairman Les Aspin. Murdock's experience in defense planning and policy also includes service on the National Security Council as senior director for Africa affairs and in multiple roles in the Central Intelligence Agency. Before turning to government service, Murdock taught for 10 years at the State University of New York at Buffalo. He is an honors graduate of Swarthmore College and holds a Ph.D. in political science from the University of Wisconsin at Madison.

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Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
Grant	Naval Postgraduate School	~\$200,000.00	STUDY: European Trilateral Nuclear Dialogue
Contract	Department of Defense	~\$230,000.00	STUDY: Alternative Defense Strategies Under Sequestration
Contract	Department of Defense	~\$200,000.00	STUDY: Highly Proliferated World
Contract	Department of Defense	~\$330,000.00	STUDY: Changing Landscape of US Nuclear Deterrence

2014

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
Grant	Naval Postgraduate School	~\$175,000.00	STUDY: European Trilateral Nuclear Dialogue
Contract	Department of Defense	~\$300,000.00	Project on Nuclear Issues
Grant	Department of Energy	~\$150,000.00	Project on Nuclear Issues
Contract	Department of Defense	~\$100,000.00	Project on Nuclear Issues

2013

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
Grant	Naval Postgraduate School	~\$250,000.00	STUDY: European Trilateral Nuclear Dialogue
Contract	Department of Defense	~\$300,000.00	Project on Nuclear Issues
Grant	Department of Energy	~\$150,000.00	Project on Nuclear Issues
Contract	Department of Defense	~\$145,000.00	Project on Nuclear Issues

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2013

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Draft HASC Testimony: Nov. 3, 2015

“Project Atom”

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The study *Project Atom* included four independent and separate assessments of US nuclear force requirements. These four separate assessments agree on several critical points, including that:

- US nuclear weapons remain “indispensable” for US deterrence goals;
- The United States should maintain the strategic nuclear triad of ICBMs, submarine-launched missiles and strategic bombers because each leg of the triad provides unique attributes important for deterrence; and, finally,
- The United States should pursue new missile defense technologies for both theater and national missile defense.

There also are, however, fundamental differences in these studies. The assessment led by my friend Dr. Barry Blechman reached some conclusions quite different from the other three analyses. It included recommendations for further unilateral deep US nuclear force reductions and the elimination of US tactical nuclear weapons by the mid-2020s.

The self-expressed presumptions underlying Dr. Blechman’s assessment are:

- The “primary objective” of US nuclear policies should be the elimination of nuclear weapons globally (p. 37);
- There will be no dramatic shifts in international politics or the conventional military balance (p. 44);
- “Nuclear weapons do not achieve US policy objectives” while “dominant conventional forces do” (p. 49), and;

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- “It is high time to acknowledge that [nuclear weapons] do very little and adapt US nuclear policy, strategy and forces to those facts.” (p. 49).

The specific adaption recommended in this particular assessment is for the United States to continue moving away from nuclear capabilities to set a good non-nuclear example for the world and to rely increasingly on a US superiority in conventional capabilities to provide the necessary deterrent effect in most situations.

In contrast, the other three independent assessments generally start from different premises and reach contrary conclusions. For example, the assessment by Tom Scheber and myself is based on the proposition that the size and character of the US nuclear force posture must be driven first and foremost by a realistic appraisal of international conditions and threats, not by presumptions of benign continuity, unending US conventional force superiority, or an overriding commitment to global nuclear disarmament.

This is a key presumption because today’s international threat environment is extremely dynamic and challenging. The *Foreword* to the 2015 *National Military Strategy of the United States*, written by the Chairman of the Joint Chiefs of Staff, describes the contemporary reality well: “Today’s global security environment is the most unpredictable I have seen in 40 years of service...global disorder has increased significantly while some of our comparative military advantage has begun to erode. We now face multiple, simultaneous security challenges from traditional state actors and transregional networks of sub-state groups—all taking advantage of rapid technological change.” These will have, “increasing implications to the U.S. homeland.”¹

Given this security environment, the United States must prepare its forces to deter foes and assure allies across many possible dramatic negative shifts in international relations and the erosion of US conventional military superiority in some key areas.

¹ Joint Chiefs of Staff, *The National Military Strategy of the United States of America 2015* (Washington, D.C.: Joint Chiefs of Staff, June 2015), p. i, available at http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf.

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It is far from clear that reliably superior US conventional forces will exist in some key geographical areas to provide the desired deterrent or assurance effects, now or in the future. In 2014, then-Secretary of Defense Chuck Hagel stated that “We are entering an era where American dominance in key warfighting domains is eroding.”² Then-Commander of PACOM, ADM Sam Locklear, stated that, “Our historic dominance that most of us in this room have enjoyed is diminishing, no question...We need to think about all scenarios, not just the ones we’ve been dealing with over the last several years where we’ve enjoyed basic air superiority and basic sea superiority. There are places in the world where in this century we won’t have them.”³ Under Secretary of Defense Frank Kendall similarly said, “Our technological superiority is very much at risk, there are people designing systems to defeat us in a very thoughtful and strategic way.”⁴

This year, Deputy Secretary of Defense Robert Work warned that, US military “technological edge” is “steadily eroding”⁵ and Secretary of Defense Ash Carter testified that, Russia, China, Iran and North Korea have been “pursuing long-term, comprehensive military modernization programs to close the technology gap that has long existed between them and the United States.”⁶

Further, for almost a decade now we have seen very dangerous and even radical developments in international relations, with the expansion of potential opponents’ nuclear and non-nuclear capabilities playing a leading role. Russia is forcibly changing established European borders under the cover of nuclear first-use threats and a nuclear build-up, while China expands its appetite dramatically in

² Chuck Hagel, “Subject: The Defense Innovation Initiative,” *Defense.gov*, November 15, 2014, available at <http://www.defense.gov/Portals/1/Documents/pubs/OSD013411-14.pdf>.

³ Andrew Tilghman, “PACOM Chief: Uncontested US Control of Pacific Is Ending,” *Defense News*, January 15, 2014, available at <http://archive.defensenews.com/article/20140115/DEFREG02/301150033/PACOM-Chief-Uncontested-US-Control-Pacific-Ending>.

⁴ Sydney Freedberg Jr., “‘We’ve Got To Wake Up’: Frank Kendall Calls for Defense Innovation,” *Breaking Defense*, August 6, 2014, available at <http://breakingdefense.com/2014/08/weve-got-to-wake-up-frank-kendall-calls-for-defense-innovation/>.

⁵ Robert Work, “The Third U.S. Offset Strategy and its Implications for Partners and Allies,” *Defense.gov*, January 28, 2015, available at <http://www.defense.gov/News/Speeches/Speech-View/Article/606641/the-third-us-offset-strategy-and-its-implications-for-partners-and-allies>.

⁶ Ashton Carter, “Submitted Statement – House Armed Services Committee (Budget Request),” *Defense.gov*, March 18, 2015, <http://www.defense.gov/News/Speeches/Speech-View/Article/606654>.

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Asia. A senior Chinese Admiral recently told the Japanese that the South China Sea “belongs to China.”⁷

Two foreign observations perhaps capture these threat developments. The first is by the noted Russian journalist, Alexander Golts, who observed, “The West has forgotten how it had used nuclear deterrence to coexist with the Soviet Union. Now it will have to open up that playbook once more.”⁸ The second is by the Socialist President of France: “The international context does not allow for any weakness. . . . The era of nuclear deterrence is therefore not over. . . . In a dangerous world—and it is dangerous—France does not want to let down its guard. . . . The possibility of future state conflicts concerning us directly or indirectly cannot be excluded.”⁹

Our comforting assumption of a benign post-Cold War world order and a perpetual “peace dividend” has been overtaken by the reality of these particularly threatening developments, and many others. And, as Secretary of Defense Ash Carter recently noted, there is no apparent end in sight for these developments. We need to plan our deterrence and assurance strategies and capabilities according to these realities—not past hopes and expectations.

In this context, the proposition that the goal of nuclear disarmament should be the overarching driver of US nuclear policies is misguided, even dangerous. Why? Because nobody has offered even the vaguest credible outline of how to make nuclear disarmament a reality in an international system characterized by hostility, mistrust and conflict. When you get through all the nuclear zero slogans in this regard, remaining is the assertion that nuclear disarmament will be possible when the international system becomes so enlightened, cooperative and reasonable that nuclear disarmament is possible. This is a breathtaking tautology.

⁷ Franz-Stefan Gady, “Chinese Admiral: South China Sea ‘Belongs to China,’” *The Diplomat*, September 16, 2015, available at <http://thediplomat.com/2015/09/chinese-admiral-south-china-sea-belongs-to-china/>.

⁸ Alexander Golts, “Russia Is Turning Into a Rogue State,” *The Moscow Times*, January 26, 2015, available at <http://www.themoscowtimes.com/opinion/article/russia-is-turning-into-a-rogue-state/514899.html>.

⁹ “Hollande Stresses the Need for Nuclear Deterrent,” *The Local*, February 20, 2015, <http://www.thelocal.fr/20150220/hollande-stresses-importance-of-frances-nuclear-deterrent>.

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As James Madison said in support of the US Constitution in 1788: “if all men were angels, there would be no need for government.” Madison’s point was not that there is a coming world without governments, but that all men self-evidently are *not* angels and thus governments are necessary. Similarly, because all countries self-evidently are *not* cooperative, enlightened and reasonable, effective nuclear deterrence is necessary. There is zero evidence of any profound change in that fundamental reality.

There is instead considerable evidence to the contrary, which is why the bipartisan Strategic Posture Commission, the Perry-Schlesinger Commission concluded in its 2009 final report that, “The conditions that might make the elimination of nuclear weapons possible are not present today and establishing such conditions would require a fundamental transformation of the world political order.”¹⁰ Until that fundamental transformation of the world order takes place, we must make nuclear deterrence as effective as possible.

What are the pertinent implications of these realities? The US force posture must be sufficiently adaptable, flexible and resilient to deter a variety of foes and assure a variety of allies across a dramatically shifting threat environment. As former STRATCOM Commander, General Robert Kehler has observed, “Surprise is a problem in a constantly changing world environment. In my view, the future requires adaptive and flexible [US] capabilities to respond to unanticipated threats.”¹¹

Precisely so; this is why the US must work to sustain or expand the force posture qualities of adaptability, flexibility and resilience in the contemporary threat environment. This is the standard of adequacy we need to meet now and for the future. There are several steps that could be taken to increase the adaptability of the US nuclear force. Further deep reductions in US nuclear forces, however,

¹⁰ William J. Perry and James R. Schlesinger, Chairman and Vice Chairman, *America’s Strategic Posture: The Final Report of the Congressional Commission on the Strategic Posture of the United States* (Washington D.C.: United States Institute of Peace Press, 2009), p. xvi, available at http://www.usip.org/sites/default/files/America's_Strategic_Posture_Auth_Ed.pdf.

¹¹ General Kehler’s response to “Advance Questions for General C. Robert Kehler, USAF, Nominee for Commander, United States Strategic Command,” House Committee on Armed Services, Subcommittee on Strategic Forces, March 2, 2011, p. 9.

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would likely instead undercut these very qualities that may be critical to deterring war and assuring nervous allies.

In addition, further deep US nuclear reductions and the elimination of US tactical nuclear capabilities in particular would likely further undermine the credibility of the US nuclear umbrella for some understandably very nervous allies and friends, especially if done unilaterally. The result could be a future “cascade” of nuclear proliferation. An example of this dynamic in action is the current manifest desire of some in South Korea for the return of US nuclear capabilities and/or for independent South Korean nuclear capabilities. If you care about non-proliferation, you **must** also care about the continuing credibility of US extended deterrence: it is the single most important non-proliferation tool.

Finally, a critical but little-recognized element of US resilience is the readiness of the US nuclear infrastructure. This was the subject of a 2015 bipartisan report entitled, *Assessment of U.S. Readiness to Design Develop and Produce Nuclear Warheads* by Tom Scheber of the Bush Administration and John Harvey of the Obama Administration (Summary attached). Key conclusions of the study are that:

Establishing a nuclear weapon readiness program should be a national priority in order to provide resilience for new and unforeseen challenges ahead. The [US] nuclear infrastructure and personnel could be called upon to diagnose and fix an unexpected reliability problem in a warhead type, replace older warheads with similar or different warhead types, increase the number of deployed warheads, or design with different military capabilities. Currently, it is not ready to respond.¹²

And

...today’s nuclear stockpile is essentially composed of warheads left over from the Cold War...No other important US military capability has been

¹² Thomas Scheber and John R. Harvey, *Assessment of U.S. Readiness to Design, Develop and Produce Nuclear Warheads: Current Status and Some Remedial Steps* (Fairfax, VA: National Institute Press, 2015), pp. xi-xii, available at <http://www.nipp.org/wp-content/uploads/2015/10/Assessment-of-US-Readiness-for-web.pdf>.

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“frozen” for over two decades and not been adapted to the emerging security environment.¹³

Indeed, in 2008, then-Secretary of Defense Gates and Secretary of Energy Bodman reported to Congress that, “The United States does not have the ability to produce new nuclear weapons.”¹⁴ In this regard, I am pleased to report that senior civilian and uniformed officials, including Secretary of Defense Ashton Carter, now state explicitly that the US nuclear deterrent is DoD’s number one priority.

In conclusion, US forces must be able to adapt to an increasingly dangerous and unpredictable threat environment—not geared to set expectations of a benign world order, great US conventional force superiority, a never-ending peace dividend, or the goal of nuclear disarmament.

The now-apparent dangers of the post-Cold War threat environment have come as a great surprise to many. For two decades, Western defense thinking in general, but particularly about nuclear weapons, has been geared to the belief in a benign new world order in which nuclear weapons would play an ever-smaller role on the path to nuclear zero. That belief has been the backdrop for decades of deep US nuclear reductions and a general lack of attention to US nuclear forces. As former Secretary of Defense Gates recently stated, “I spent virtually the entire four and a half years that I was secretary of defense trying to get first, the executive branch, and then Congress, to figure out a way to modernize the nuclear weapons we already have. That effort was a signal failure.”¹⁵ The realities of contemporary threats now argue strongly in favor of modernizing US nuclear forces and emphasizing their adaptability, not further reductions and greater rigidity. That is the primary take-away of the assessment contributed by Tom Scheber and myself.

Thank you.

¹³ Ibid., p. 4.

¹⁴ Samuel W. Bodman and Robert M. Gates, *National Security and Nuclear Weapons in the 21st Century* (Washington D.C.: U.S. Department of Defense, September 2008), p. 2, available at <http://www.defense.gov/Portals/1/Documents/pubs/nuclearweaponspolicy.pdf>.

¹⁵ Quoted in, Bill Gertz, “Gates: Russia Sought to Abandon Nuclear Missile Treaty in 2007,” *The Washington Free Beacon*, October 27, 2015, available at <http://freebeacon.com/national-security/gates-russia-sought-to-abandon-nuclear-missile-treaty-in-2007/>.

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CEO and President

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Dr. Payne is the Chairman of the U.S. Strategic Command's Senior Advisory Group, Strategy and Policy Panel, editor-in-chief of *Comparative Strategy: An International Journal*, and co-chair of the U.S. Nuclear Strategy Forum. He served as a Commissioner on the bipartisan Congressional Commission on the Strategic Posture of the United States, the Secretary of State's International Security Advisory Board, as co-chairman of the Department of Defense's Deterrence Concepts Advisory Group, and also as a participant or leader of numerous governmental and private studies, including White House studies of U.S.-Russian cooperation, Defense Science Board Studies, and Defense Department studies of missile defense, arms control, and proliferation. He was a primary contributor to the 2001 Nuclear Posture Review, and has served as a consultant to the White House Office of Science and Technology Policy, the Arms Control and Disarmament Agency, and participated in the 1998 "Rumsfeld Study" of missile proliferation.

Dr. Payne has lectured on defense and foreign policy issues at numerous colleges and universities in North America, Europe, and Asia. He is the author, co-author, or editor of over one hundred and fifty published articles and eighteen books and monographs, some of which have been translated into German, Russian, Chinese or Japanese. His most recent monograph is entitled, *Nuclear Force Adaptability for Deterrence and Assurance: A Prudent Alternative to Minimum Deterrence* (with Dr. John Foster). Dr. Payne's articles have appeared in many major U.S., European and Japanese professional journals and newspapers.

Dr. Payne received an A.B. (honors) in political science from the University of California at Berkeley in 1976, studied in Heidelberg, Germany, and in 1981 received a Ph.D. (with distinction) in international relations from the University of Southern California.

**DISCLOSURE FORM FOR WITNESSES
COMMITTEE ON ARMED SERVICES
U.S. HOUSE OF REPRESENTATIVES**

INSTRUCTION TO WITNESSES: Rule 11, clause 2(g)(5), of the Rules of the U.S. House of Representatives for the 114th Congress requires nongovernmental witnesses appearing before House committees to include in their written statements a curriculum vitae and a disclosure of the amount and source of any federal contracts or grants (including subcontracts and subgrants), or contracts or payments originating with a foreign government, received during the current and two previous calendar years either by the witness or by an entity represented by the witness and related to the subject matter of the hearing. This form is intended to assist witnesses appearing before the House Committee on Armed Services in complying with the House rule. Please note that a copy of these statements, with appropriate redactions to protect the witness's personal privacy (including home address and phone number) will be made publicly available in electronic form not later than one day after the witness's appearance before the committee. Witnesses may list additional grants, contracts, or payments on additional sheets, if necessary.

Witness name: Keith B. Payne

Capacity in which appearing: (check one)

☒ Individual

☐ Representative

If appearing in a representative capacity, name of the company, association or other entity being represented: _____

Federal Contract or Grant Information: If you or the entity you represent before the Committee on Armed Services has contracts (including subcontracts) or grants (including subgrants) with the federal government, please provide the following information:

2015

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
n/a			

2014

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
n/a			

2013

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n/a			

2013

Foreign contract/ payment	Foreign government	Dollar value	Subject of contract or payment
n/a			

November 3, 2015

**Testimony before the House Armed Services Subcommittee on Strategic Forces
Adapting U.S. Nuclear Strategy and Posture to a More Contested and
Competitive World**

Elbridge A. Colby, Robert M. Gates Senior Fellow
Center for a New American Security

Mr. Chairman, Ranking Member Cooper, and distinguished members of the committee, thank you for inviting me to testify today on the future of America's nuclear deterrent. It is an honor to speak to you today on this matter of the greatest importance to our nation's security.

Continuity has been a hallmark of U.S. nuclear policy and posture, but so too have adaptation and evolution. This is only natural, as effective deterrence is not the result of a static formula divorced from context but rather the product of relating credible threats to the scale, scope, and intensity of the challenges to the nation's security. If, then, the U.S. nuclear posture is to be effective in deterring potential adversaries and reassuring allies and partners, it must adapt to the strategic and military-technological circumstances the nation and the beneficiaries of its extended deterrent face. And the fact is that contemporary and likely future circumstances require substantial adaptation of our nuclear strategy and posture.

The Changing Global Geopolitical and Military-Technological Landscape

We are entering a period of significant and possibly dramatic change in both the geopolitical and military-technological spheres. First, global geopolitics are becoming markedly more contested, and are increasingly being defined by the rise of a more capable and assertive China, a resurgent and revanchist Russia, and a host of more powerful regional players whose strategic trajectories are uncertain. This is a world in which the United States can and should strive to maintain its leading position, but in which it will face more serious competition in seeking to do so.

These dynamics will have significant ramifications in the nuclear policy realm because these tectonic shifts in power, and the new ambitions they will enable, look set to put increasing pressure on the legacy U.S.-led security architectures in Europe, East Asia, and the Middle East. In brief, the United States is likely to confront more significant challenges to its interests and alliances from more capable powers than appeared likely to be the case even a few years ago – particularly from China in Asia and from Russia in and around Europe.

At the same time, the military-technological environment is also undergoing rapid and in some cases profound change in ways that will substantially influence U.S. nuclear policy. Most importantly, as the Pentagon has been increasingly making clear, a growing number of countries are exploiting the opportunities provided by advanced technologies to improve the potency, reach, and flexibility of their military forces. This is true above all of China and Russia, which are – not coincidentally – also the United States’ prime competitors in the nuclear sphere.

In practice, this means that U.S. conventional military advantages over its plausible opponents will likely narrow, particularly with respect to China and, to a lesser degree, Russia. This will represent a marked shift from the era following the Cold War, when U.S. nonnuclear forces enjoyed a commanding mastery over potential adversaries, an ascendancy that effectively allowed the United States to rely on these forces for dealing with nearly all plausible contingencies about which it cared. Looking to the future, however, the United States will have to strive – vigorously in certain domains and regions – for nonnuclear military advantage rather than simply assume it.

The combination of these geopolitical and military-technological developments will have substantial implications for U.S. nuclear policy. The geopolitical developments mean that the United States is likely to face renewed strategic competition with countries that wish to revise the regional orders they inhabit or even the global order by exploiting their newfound strength with respect to the United States and its traditional allies. This will heighten the possibility of serious conflict with major nuclear-armed powers, necessitating that the United States grapple more earnestly with the possibility of conflict under the nuclear shadow and even with the possibility of nuclear conflict itself. At the same time, because of the growing competitiveness of the military forces of its potential adversaries, the United States will not be able to rely so significantly and so confidently on its nonnuclear forces to deter and, if necessary, to prevail against its and its allies’ opponents. This means that the United States may need to consider shifting more weight on to its nuclear forces in order to compensate for the diminished coercive power of its conventional military.

U.S. Nuclear Strategy

In light of these significant and continuing changes, the United States will therefore need to think anew about the roles and missions of its nuclear forces, their composition, how they and their potential employment are best explained, and how they should be postured and, if need be, used. The entry into office of a new presidential administration in January 2017 will offer an excellent opportunity for such new thinking. Much continuity will be in order, as there is much in past nuclear policy that can and should be carried forward; moreover, it is important for the United States to signal stability and continuity in such a weighty matter.

Nonetheless, a revised U.S. nuclear policy should also depart in important respects from past thinking, including the 2010 Nuclear Posture Review, which focused on continuing reductions in the numbers and narrowing the salience of U.S. nuclear forces, prioritized addressing nuclear terrorism rather than the deterrence of major war and aggression as the prime focus of U.S. nuclear policy, and effectively established a policy by which the United States would extend a basically static and progressively shrinking nuclear force into the indefinite future. This review reflected an underlying confidence that geopolitical and military-technological conditions would not materially worsen for the United States and its allies. Yet such confidence now appears unfounded, and thus a new look is in order.

An appropriately revised nuclear policy and posture would adapt the nation's nuclear policy and posture to this new era while remaining in basic and primary continuity with the long-established U.S. approach toward the nation's reliance on "the absolute weapon." In particular, such an approach would emphasize a greater degree of discrimination and flexibility in the U.S. posture.

The Roles and Missions of U.S. Nuclear Weapons

The principal role for U.S. nuclear weapons should continue to be to deter major aggression and coercion of all kinds against the United States and its allies. The United States should seek to rely where possible – at reasonable cost and risk – on its and its allies' conventional forces for deterrence, but U.S. nuclear forces should serve as a backstop for these conventional forces should they fail to achieve U.S. objectives or if the costs or risks of such an effort become too great. While the United States should rely on its nuclear forces for more than solely deterrence of nuclear attack, they should be reserved only for the most severe types of nonnuclear aggression.

That said, given ongoing trends in the global security environment, the relative value of U.S. nuclear weapons will likely rise. This is both because nuclear weapons have become or are likely to become more salient in the strategies and military postures of Russia, China, and North Korea and because at least some potential U.S. adversaries, particularly China, are likely to become relatively stronger and be able to challenge U.S. conventional military advantages, especially regionally. These factors mean that, if the United States continues to want to extend deterrence effectively, it will need to rely more than it has in the recent past on its own nuclear forces in order to compensate for its diminished conventional advantages to deter and, if necessary, prevail against the strategies and capabilities of its potential adversaries.

To accomplish this, U.S. nuclear weapons need to do more than threaten unhindered devastation, particularly if America's extended deterrent is to remain credible and effective. Under continuing conditions of U.S. conventional superiority in areas of vital interest, nuclear weapons should play an important reserve role in U.S. planning regarding war termination and escalation control, primarily as a deterrent to a losing adversary's effort to "cheat" the rules of a war that the United States is winning and wishes to keep conventional. In this role, U.S. nuclear forces will provide a powerful disincentive to an adversary contemplating seeking to use its nuclear forces to dramatically escalate a conflict and either break U.S. or allied will or short-circuit U.S. conventional dominance. U.S. nuclear forces will need to be appropriately structured and tailored to respond to such a limited nuclear attack.

In a situation in which the United States has lost the conventional advantage, however, U.S. nuclear weapons should play a vital role in bringing a war the United States and its allies are losing to a tolerable close. While such a loss of conventional advantage appears unlikely for the nearer term, this eventuality could develop in particular in maritime Asia, where the United States could lose its conventional dominance should it not take sufficiently effective and resolute actions to maintain its margin over China. In such an event, U.S. nuclear forces will need to provide the United States with credible options for controlled escalation against China, options designed to telegraph firm U.S. resolve to continue escalating, positively influence the conventional military conflict that would be the presumed precursor for such use, and demonstrate a willingness to end the conflict on mutually satisfactory terms.

Declaratory Policy

U.S. declaratory policy should emphasize U.S. resolve and ability to employ nuclear weapons to defeat or retaliate against major aggression while simultaneously emphasizing U.S. commitment to the responsible stewardship of and restraint regarding these awesome weapons. The United States should

therefore state that it stands ready to use nuclear weapons in the event of major aggression against itself or its allies, but that it will only contemplate employment of its arsenal in extreme circumstances and for strategically defensive purposes. The precise contours of these criteria should be left deliberately ambiguous, but the doctrine should be explained as one designed to chill adversaries' consideration of resorting to the use of nuclear weapons, strategically significant weapons of mass destruction (WMD), massive conventional force, or comparable forms of violence against the United States or its allies.

Finally, the United States should emphasize that it will seek to "minimize" (rather than "reduce," as in the current parlance) its reliance on nuclear forces in its security strategy. This emphasis should be designed to suggest the interest of the United States in keeping the salience of its nuclear forces as modest as feasible without pledging a continuing reduction, a reduction that cannot be justified divorced from the strategic context.

Employment Policy

In addition to ensuring the basic retaliatory deterrent function that has always been a longstanding focus of the nation's nuclear policy, U.S. employment policy should emphasize U.S. capability for and willingness to wield nuclear weapons discriminately. That is, while the ultimate source of U.S. deterrence should remain the threat of the overwhelming devastation that would be wrought by release of the full power of the U.S. nuclear force, the United States should also prepare for and make clear that it would, as appropriate, use its nuclear force in more limited fashion for more focused effect.

In particular, the United States should develop capabilities, options, and doctrine to enable limited and tailored nuclear strikes – including with varying yields, trajectories, and target types – designed to demonstrate resolve and the preparedness to escalate further to an opponent, degrade the enemy's capability to persist in the actions to which the United States was objecting (e.g., by attacking an adversary's conventional or theater nuclear forces engaged in a regional conflict that had been the catalyst for escalation to the nuclear level), and clearly convey a measure of restraint and thus willingness to terminate the war.

The logic of this policy would be to render more credible and effective the U.S. nuclear deterrent for less than total contingencies, such as regional conflicts, and in particular for extended deterrence scenarios. In these situations, total release of U.S. nuclear forces would not be particularly credible, let alone appropriate. These capabilities would be especially useful for deterrence of Russia and China and escalation management in the event of conflict with them. Each of these two states possesses substantial survivable strategic nuclear forces of their own that would compel the United States to seek to limit any war. But such tailored capabilities could also be applicable in the event of conflict with North Korea, which is moving in the direction of obtaining potentially survivable and iteratively usable nuclear forces. Accordingly, the United States should make a special effort to develop the platforms and weapons, doctrine, planning capacity, and other capabilities needed to fight a limited nuclear war more effectively than plausible adversaries. Such superiority in the ability to fight a limited nuclear war would give the United States coercive leverage over these potential opponents – leverage that could become significant and even crucial in the event of war.

U.S. Nuclear Posture

The Composition of the U.S. Nuclear Force

The ideal U.S. nuclear force, therefore, is one that is not only highly survivable and able to issue a devastating blow against any adversary under any scenario, but that is also capable of conducting effective limited nuclear operations in a controlled fashion while maintaining the ability to escalate to

full-scale war if necessary. It is a force that can achieve reasonably precise effects for U.S. national decisionmakers across a wide spectrum of possible scenarios, enabling a more effective limited nuclear war capability and thus providing greater leverage and advantage for the United States.

The U.S. nuclear force of today is not optimally designed for this demanding set of criteria. To optimize its nuclear force structure, the United States should invest in an improved nuclear command and control system and maintaining the nuclear triad:

Nuclear Command and Control: Nuclear forces need to be able to perform their missions reliably under any plausible conditions, including the most stressing forms of attack, and need to do so in sufficiently controlled and deliberate fashions. Accordingly, the United States should invest heavily in a survivable and resilient nuclear command and control system that can provide sure and reliable communications, enable a wide variety of taskings, and disseminate detailed information to forces – and do all of these things in an iterated fashion. Achieving this in an increasingly perilous and competitive military environment entails that the United States explore novel ways of communicating and of protecting communications and that it develop more resilient space assets, more terrestrial and air-breathing platforms for C4ISR, and a more modular and disaggregated architecture. This should allow the United States to conduct effective nuclear operations even if an adversary is able to deny or substantially degrade U.S. use of elements of its nuclear command and control system, such as its space assets.

Maintaining the Triad: The United States should maintain a triad of SSBNs, ICBMs, and nuclear-armed bombers to ensure a resilient, redundant, and highly capable nuclear deterrent.

- *Submarines.* The United States should fully fund the *Ohio* ballistic-missile submarine replacement program, with a particular emphasis on maintaining the submarine's ability to operate securely and clandestinely over its full lifetime.
- *ICBMs.* Once life extension of the Minuteman III is no longer practicable or if the United States determines it needs greater capability from its ICBM force, the United States should replace the Minuteman III with a modernized ICBM, likely also emplaced in existing silos.
- *Bombers.* The United States should maintain and modernize its fleet of nuclear-armed bombers to ensure they and/or their weaponry are able to penetrate to strike highly defended targets. This modernization effort is particularly important in light of the unique attack capabilities found in the bomber force and the growing challenges to stealth and other traditional U.S. approaches to penetration of adversary air defenses.
 - *Penetrating long-range strike bomber (LRSB)/family of systems.* This critical aircraft/family of systems should be procured as a low-observable/stealth penetrating platform, made nuclear-capable (or at least some fraction of the total force should be), and equipped to deliver both nuclear gravity bombs and nuclear-armed cruise missiles.
 - *Standoff bomber.* B-52Hs should be maintained in a standoff role as long as practical and affordable. The B-2A fleet, meanwhile, should be equipped for effective standoff attack, especially as their penetration capability diminishes in light of challenges to stealth technology.
 - *Dual-capable shorter-range attack aircraft.* The United States should procure sufficient numbers of F-35 aircraft in a dual-capable mode to provide for theater deterrence and assurance purposes in Europe, East Asia, and the Middle East. These aircraft

are the only purely “tactical” or theater nuclear weapons platforms in the U.S. inventory and thus are particularly useful for tailored assurance and deterrence strategies. The United States will need to acquire enough such dual-capable aircraft to enable forward deployment in multiple regions simultaneously.

- *Standoff munitions.* While the United States should invest substantially in developing and procuring a long-range bomber and associated family of systems capable of penetrating the most advanced air defense systems, it would also behoove the country to possess a suite of long-range standoff nuclear attack munitions that can alleviate the need for penetration. This is important particularly due to the growing capabilities of adversary integrated air defense systems and rising questions concerning the long-term viability of stealth and other methods of ensuring penetration. The new long-range standoff missile (LRSO) is intended to be the system that addresses this problem.

In addition, the U.S. nuclear force as a whole should be oriented towards greater flexibility and discrimination and, of increasing importance, earth penetration.

Greater Flexibility and Discrimination: The United States should move in the direction of providing all its nuclear forces with variable yield warheads/weapons that can provide a variety of types of effects (e.g., electromagnetic pulse (EMP), different height of burst) so that the United States can more effectively tailor strikes from the full range of its available platforms. To the extent feasible, the United States should invest in enabling a greater degree of variability of yield in its warheads and gravity bombs and in enabling these weapons to be employed in a variety of different modes, for instance, at sea and at varying elevations. The United States should in particular focus on making the ballistic missile force more capable of discriminate strikes. The United States should accordingly render at least some portion of the Trident II D5 SLBM arsenal capable of lower yield strikes, for instance by using primary-only warheads. The United States should also ensure that the LRSO is capable of discriminate employment by arming it with a variable yield warhead.

Earth Penetration: Earth penetration should be a special focus of long-term research and development and, ultimately, procurement. As a number of expert bodies have pointed out, there appear to be significant limits to the effectiveness of straightforward earth penetration systems. Given the proliferation of hardened and deeply buried targets (HDBTs), however, and the importance of denying potential adversaries sanctuary – not just for deterrence but also for stability – it is crucial for the United States to have concepts of operations and appropriate capabilities able to credibly hold at risk these facilities, and potentially significant numbers of such facilities. Addressing this worsening problem should therefore be a significant focus of U.S. investment.

The U.S. nuclear infrastructure also should be substantially upgraded.

Responsive Infrastructure: It is important to emphasize the essential value of a responsive infrastructure. This is vital to the long-term health and ultimately the deterrent credibility of the U.S. nuclear posture. The goal of the United States should be to develop a nuclear weapons infrastructure responsive to evolving national strategic requirements. The United States should regard the nuclear weapons complex to be sufficiently responsive when it has attained the capability, capacity, and agility to turn over the entire stockpile in a timely fashion (on the order of 10 years) and to respond to emerging threats over the medium term.

Finally, decisions about the size and composition of the U.S. stockpile should be made based on strategic considerations.

Size and Composition of the Stockpile: The United States should avoid reductions for their own sake with respect either to the deployed force or to the geopolitical hedge. Reductions in general below New START levels should be disfavored barring a compelling rationale. Reductions from the technical hedge should be undertaken once a truly responsive infrastructure has been developed, the stockpile has been sufficiently modernized, and as greater confidence is developed regarding the reliability of relevant warhead classes. Arms control efforts, meanwhile, should be pursued where they constructively contribute to stability rather than as means of reducing numbers of systems.

Conclusion

The world is changing in ways that dictate that U.S. nuclear policy and posture should also change. The renewal of competition among the major states, the shifts of power in the international system away from traditional U.S. allies and toward some potential U.S. adversaries, and the narrowing of U.S. nonnuclear military advantages all mean that the United States needs to reexamine and revise its nuclear policy and posture. The next NPR offers an excellent opportunity to do just this, and to do so while many of the trends demanding this reexamination are evident but still inchoate and susceptible to more effective counteraction by the United States. The United States should therefore grasp this opportunity to adapt its nuclear policy and posture, maintaining U.S. strategic advantages and mitigating vulnerabilities and weaknesses where possible.

It is worth explaining why this is not only important but also justified, for nuclear weapons are terrible weapons capable of killing large numbers of people in short order. Any substantial modernization of such arms requires a rationale beyond the desire of a nation to maintain primacy, bureaucratic inertia, or pride. The modernization program laid out in this document does have such a rationale. And that is that U.S. nuclear weapons continue to offer the prospect of deterring major aggression against not only the United States but also a wide range of like-minded states, and doing so with unique efficacy.

The modernization program here is offered in the hopes of making this most formidable of deterrents as effective in the future as it has been since its inception, a 75-year period correlated with an unprecedented abeyance of major power war and the protection, maturation, and expansion of free systems of sociopolitical organization. If the United States continues to use its nuclear forces as the cornerstone of its own security and the security of its like-minded allies and partners, and thinks about how to use those forces sternly but responsibly, then a modernization program that will make that deterrent more effective in a new era is not just defensible – it is actually incumbent upon the country to support it.

Elbridge Colby
Robert M. Gates Senior Fellow
Center for a New American Security

Elbridge Colby is the Robert M. Gates Senior Fellow at the Center for a New American Security (CNAS), where he focuses on issues relating to defense strategy, deterrence, nuclear weapons, conventional forces, U.S. alliances, intelligence, and related issues.

In 2012, he served as the deputy head for national security personnel on the Mitt Romney pre-transition effort and also worked on several of the campaign's security policy teams. From 2010 to 2013 he was a principal analyst and division lead for global strategic affairs at CNA. Before that, he served for over five years in the U.S. Government, including as policy advisor to the Secretary of Defense's Representative for the new Strategic Arms Reduction Treaty, as an expert advisor to the Congressional Strategic Posture Commission, as a staff member on the President's Commission on the Intelligence Capabilities of the U.S. Regarding WMD, with the Coalition Provisional Authority in Iraq, and with the State Department. Colby also serves or has served as a consultant to a variety of U.S. Government entities on a range of defense and intelligence matters. In 2014 he served as a staff member for the National Defense Panel.

Colby is a frequent commentator and author on defense and foreign policy issues. He has co-edited a volume on *Strategic Stability: Contending Interpretations* (2013), co-chaired a CSIS working group study on U.S.-China nuclear weapons issues entitled *Nuclear Weapons and U.S.-China Relations: A Way Forward* (2013), and has published book chapters in a number of edited collections. He also writes regularly on defense and foreign policy issues in a variety of venues such as *The New York Times*, *The Wall Street Journal*, *The National Interest*, *Foreign Policy*, and *War on the Rocks*. He speaks frequently to government, expert, university, and broader public audiences in the United States, Europe, and Asia, and is a regular participant in Track II discussions.

He is a recipient of the Exceptional Public Service Award from the Office of the Secretary of Defense and of the Superior and Meritorious Honor Awards from the Department of State. Colby is a graduate of Harvard College and Yale Law School.

1152 15th Street, NW
Suite 950
October 26, 2015

Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515-6035

Mr. Chairman, Ranking Member Cooper, and Distinguished Members of the Committee:

Thank you very much for inviting me to testify on this topic of the greatest importance to the nation's security. I am testifying as the Robert M. Gates Senior Fellow at the Center for a New American Security (CNAS). While I am testifying in a representative capacity, the views I express during my testimony and in my prepared remarks are my own and do not necessarily reflect the views of the Center.

I provide on the attached Committee template form the projects I have directly received and led at CNAS from government sources. In the attached addendum I provide information on all of the grants and contracts (including sub-grants and subcontracts) received by CNAS as a whole from U.S. Government and foreign government sources during 2013-2015.

I am not testifying as a representative of my previous employer, the CNA Corporation, where I worked as a full-time employee until 2013 and remain as an adjunct staff member. I consulted with CNA about my declaration and they informed me that I did not personally receive, hold, or control any contracts from/with the Federal Government during my employment there. The Center for Naval Analyses has one Federally-Funded Research and Development Center vehicle which receives contracts, and those projects I worked on were under this vehicle. The granting Federal agency is the U.S. Navy and the dollar value of the five year grant (2011-2015, with a current six-month extension) to the Center for Naval Analyses is \$509,623,000. I have, however, provided information regarding government projects which I led or which CNA received listing me as the project director during 2013, before I left full-time work there.

I stand ready to provide any further information or clarification.

Sincerely,



Elbridge A. Colby
Robert M. Gates Senior Fellow
Center for a New American Security

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Witness name: ELBRIDGE A. COLBY

Capacity in which appearing: (check one)

☐ Individual

☒ Representative

If appearing in a representative capacity, name of the company, association or other entity being represented: Center for a New American Security (I am the Robert M. G

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2015

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
N00244-15-1-0056	PASCC/DDO, NAVSUP Fleet Logistics Center San Diego to C	\$149,644.85	Managing Escalation and Limiting War in a Conflict in the Western Pacific

2014

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
HQ0034-14-P-0148	DOD, OSD Net Assessment to CNAS (2014-2015)	\$101,338.28	U.S. Strategic Posture in a Proliferating World

2013

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
Unknown	NPS/PASCC to CNA (2013-2014)	\$200,000.00	Understanding Gulf States' Strategic Thinking
DCD-2012-U-000030 Project # 0005.4189 A648.00	NPS/PASCC to CNA (2012-2013)	\$225,000.00	The 1973 Yom Kippur War: Nuclear Alerts and Strategic Signaling
DCD-2012-U-002838 Project # 0003.5.0254 A841 P0	Department of the Navy (2012-2013)	\$265,000.00	Assessing Al-Qaida and Deterring Adversaries in a Nuclear Middle East: The Navy's Role

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2015

Foreign contract/ payment	Foreign government	Dollar value	Subject of contract or payment

2014

Foreign contract/ payment	Foreign government	Dollar value	Subject of contract or payment

2013

Foreign contract/ payment	Foreign government	Dollar value	Subject of contract or payment



CNAS Federal Contract or Grant Information

2015	Federal Agency	Dollar Value	Subject of Contract or Grant
Federal Grant/Contract			
HQ0034-15-C-0048	DOD, OSD Net Assessment	\$370,298	Maturing Precision Strike
HQ0034-15-C-0101	DOD, OSD Net Assessment	\$99,900	Leveraging History
Intra-governmental Personnel Act of 1970 Agreement	DOD Policy	\$99,592	IPA for Zack Hofstad
Order Number XDA1A-SUB01-POD1, Prime Contract Number: FA8750-13-C-0301 for DOD, DARPA	Grant Oak	\$74,856	Open Source Software for National Security (Disruptive Defense paper)
2010-0718815-000	Office of the Director of National Intelligence	\$5,000	ODNI Braintrust Indefinite Delivery Indefinite Quantity (IDIQ)
MO2244-15-1-0056	PASCC/DOD, NAVSUP Fleet Logistics Center San Diego to CNAS	\$149,645	Managing Escalation and Limiting War in a Conflict in the Western Pacific
Subcontract Number: 085001.011.0220.2105.3, Prime Contract Number: FA8075-14-D-0001 DSAC, Task Order 0011 for Air Force AFICA and DTIC	SURVICE Engineering	\$91,337	Beyond Armor: New Force Protection Concepts for U.S. Mounted Troops
FA3300-13-G-0014	United States Air Force	\$27,500	USAF Military Senior Fellow
TRNGRA-09Y0902BROW	United States Army	\$27,500	USA Military Senior Fellow
30-11-G81DCS134-000	United States Coast Guard	\$26,250	USCG Military Senior Fellow
MOU	United States Marine Corps	\$27,500	USMC Military Senior Fellow
MOU Between Deputy Chief of Naval Operations (Information, Plans and Strategy) Strategy and Policy Division (OPNAV NS1) and CNAS	United States Navy	\$27,500	USN Military Senior Fellow
2014	Federal Agency	Dollar Value	Subject of Contract or Grant
Federal Grant/Contract			
HQ0034-14-P-0148	DOD, OSD Net Assessment	\$101,338	U.S. Strategic Posture in a Proliferating World
Subcontract 06851-S3; Prime contract number HCL047-05-D-4000-0209 for the Air Force - SENSAC	Georgia Institute of Technology	\$91,630	Advancing U.S.-Australian Combined Amphibious Capabilities
FA3300-13-G-0014	United States Air Force	\$27,500	USAF Military Senior Fellow
TRNGRA-09Y0902BROW	United States Army	\$27,500	USA Military Senior Fellow
30-11-G81DCS134-000	United States Coast Guard	\$26,250	USCG Military Senior Fellow
MOU	United States Marine Corps	\$27,500	USMC Military Senior Fellow
MOU Between Deputy Chief of Naval Operations (Information, Plans and Strategy) Strategy and Policy Division (OPNAV NS1) and CNAS	United States Navy	\$27,500	USN Military Senior Fellow
2013	Federal Agency	Dollar Value	Subject of Contract or Grant
Federal Grant/Contract			
Subcontract agreement, Prime contract number W9133L-13-P-0066 to the National Guard Bureau, Army National Guard, Director's Action Group (ARNG-ZAD)	The COGAR Group, Ltd.	\$171,107	National Defense Strategic Planning and Policy Development Think Tank
MOU	National Counterterrorism Center (NCTC)	\$27,500	National Counterterrorism Center Fellow
FA3300-13-G-0014	United States Air Force	\$27,500	USAF Military Senior Fellow
TRNGRA-09Y0902BROW	United States Army	\$27,500	USA Military Senior Fellow
30-11-G81DCS134-000	United States Coast Guard	\$26,250	USCG Military Senior Fellow
MOU	United States Marine Corps	\$27,500	USMC Military Senior Fellow
MOU Between Deputy Chief of Naval Operations (Information, Plans and Strategy) Strategy and Policy Division (OPNAV NS1) and CNAS	United States Navy	\$27,500	USN Military Senior Fellow



CNAS Foreign Government Contract or Payment Information

2015	Foreign Contract / Payment	Foreign Government	Dollar Value	Subject of Contract or Payment
Agreement dated 11 May 2015		Embassy of Japan	\$36,000	Quarterly briefings and counsel sessions
Agreement dated 26 May 2015		Government of Japan	\$252,500	Strategic Ahead of the Curve: Alliance Requirements for Managing China's Maritime Might
Agreement between the Kingdom of Denmark and CNAS dated 4 December 2014		Kingdom of Denmark	\$91,953	Climate Change in the Developing World
MOU Between CNAS and the Ministry of Defence of Estonia		Ministry of Defence, Estonia	\$20,000	Assured Resolve
Accepted proposal for "U.S.-Taiwan Strategic Partnership"		Taiwan Economic and Cultural Representative Office (TECRO)	\$200,000	CNAS-TECRO Partnership
2014	Foreign Contract / Payment	Foreign Government	Dollar Value	Subject of Contract or Payment
Agreement Dated 11 May 2014		Embassy of Japan	\$36,000	Quarterly briefings and counsel sessions
Agreement Dated 11 July 2014		Embassy of Japan	\$249,995	A Cost-Imposing Asia Maritime Strategy: Dissuading Coercion and Building Norms
CNAS Government of Japan Maritime Security Project Contract B, Part 2 Dated 7 February 2014		Government of Japan	\$101,674	Maritime Security Project
Agreement between CNAS and the Singapore Embassy in Washington, DC		Ministry of Foreign Affairs, Singapore	\$36,669	2014 Singapore-U.S. Strategic Dialogue
1:44001332		NATO: Supreme Allied Commander Transformation Headquarters	\$59,566	Transatlantic Dialogue
Accepted proposal		Taiwan MND	\$150,000	Taiwan MND Washington Delegation
2013	Foreign Contract / Payment	Foreign Government	Dollar Value	Subject of Contract or Payment
Agreement Dated 11 October 2013		Embassy of Japan	\$30,000	Operational Implications of Japan Exercising the Right of Collective Self-Defense
Agreement Dated 1 May 2013		Embassy of Japan	\$36,000	Quarterly briefings and counsel sessions
CNAS Government of Japan Maritime Security Project Contract C Dated 18 October 2013		Government of Japan	\$294,537	Maritime Security Project
Agreement Dated 1 Feb 2013		Government of Japan	\$66,666	CNAS hosting a Japan Ministry of Defense Fellow for 12 months
Agreement Dated 30 August 2013		NATO: Public Information Programs	\$13,228	Defense Matters Series

PREPARED STATEMENT BY DR. BARRY BLECHMAN
TESTIMONY BEFORE THE STRATEGIC SUBCOMMITTEE
OF THE HOUSE ARMED SERVICES COMMITTEE

NOVEMBER 3, 2015

PROTECTING US SECURITY BY MINIMIZING THE ROLE OF NUCLEAR
WEAPONS: A NEW US NUCLEAR POLICY

Nuclear weapons are the most potent destructive force known to humanity. Yet, even though the United States enjoys a dominant geopolitical position in the world, underpinned by a conventional military superiority greater than any ever known before, US nuclear policies and doctrines remain encumbered by Cold War beliefs in the potential utility of these weapons of mass destruction. These false hopes that nuclear weapons can play a range of political and military roles in US security policy cause the United States to mistakenly pursue a nuclear strategy that is costly -- not only in material terms, but also in geopolitical terms. In the worst case scenarios, the strategy could be catastrophic in terms of human lives and the nation's future. The overarching goal of US nuclear policy and strategy should be to seek to minimize the roles played by these weapons, both in our own policies and in the policies of all other nations.

The United States enjoys conventional military superiority over every other nation in the world. As a result, in all situations in which military instruments are relevant means of defending American interests, conventional armed forces are the preferred means of protecting those interests. For the United States, nuclear weapons' only role is to deter nuclear attacks on the US and its allies. They provide no military or political advantage for the United States against any other threat. In addition, any use of nuclear weapons, no matter how limited, would end the longstanding taboo on their use and make devastating nuclear wars more likely. Consequently, US political and military strategy, diplomacy, military doctrine, and military force structure should all aim to minimize the importance accorded to nuclear weapons by the US and all other nations.

US Conventional Military Dominance

The key attribute of the US military posture is the conventional military dominance it currently enjoys and will likely be able to maintain for the next several decades, assuming that US citizens are willing to invest sufficient resources to preserve the nation's current advantages. Although military instruments are inherently limited in the strategic and policy goals they can achieve alone, conventional military superiority provides the US with the ability to defend itself, its allies, and its global interests whenever military means are relevant.

The US enjoys conventional superiority because of the scale and longevity of its investments in relevant technologies, the size of its forces, and the qualities and training of the people in its

armed forces. The United States leads the world in military technologies. Sensors on satellites and manned and unmanned aircraft, paired with redundant global command, control and communications networks, provide unprecedented and unparalleled situational awareness to US political and military leaders. Precision-guided munitions launched from air, sea, and land platforms offer the potential for US armed forces to eliminate targets with a degree of speed and accuracy that was unimagined only a few decades ago. Furthermore, the United States maintains unmatched capabilities to project military power around the world, including large and small aircraft carriers, sea- and air-launched cruise missiles, penetrating strike aircraft and bombers, a large fleet of cargo and tanker aircraft, and mobile theater missile defenses. The US can move large numbers of Marines and/or Army forces rapidly to distant regions. And, finally, the United States has unique capabilities to deploy significant numbers of technologically advanced Special Operations Forces almost anywhere in the world on short notice.

The US can capitalize on these advanced military technologies because of its investment in people and its unique military culture. As one of the first nations to abandon conscription, the US all-volunteer force provides greater selectivity and longer tenures than conscripted forces, resulting in the high caliber of individuals serving in the military. The qualities of these individuals are further enhanced by the significant and unmatched investments in training made by the United States. No other nation provides as frequent opportunities for its fighting men and women to conduct training operations on their equipment or in simulators, both in small units and in larger exercises. Finally, an American culture of individual initiative, combined with high-quality, well-trained personnel, produces the ability for US armed forces to conduct complex, decentralized military operations more effectively than any other state.

Besides the quality edge in both people and equipment, the United States also has a massive quantitative advantage in most types of military capabilities. The US has long been the greatest spender on armed forces. The US maintains more people in active service than any country other than China, and much of China's military consists of domestically focused conscript forces. The US maintains larger numbers of warships, bombers, and advanced tactical fighters than any other nation, and its forces of armored and wheeled ground vehicles are at least comparable in size to other nations. Moreover, each of these pieces of equipment also is qualitatively superior to any other counterpart.

US conventional dominance is not guaranteed and depends on a continued high level of investment, efficient use of resources, and the continuing willingness of US citizens to sacrifice personal resources to provide sufficient national resources. But the previous high levels of investments do mean the United States has conventional military superiority today in almost every respect. And assuming continuing high levels of investment, US conventional superiority is likely to endure for at least several decades. Relative US economic dominance is declining as other nations develop, but the US will remain a very wealthy nation with vast resources for

decades to come. The US has untapped capacity to expend significantly greater resources on defense, as it has demonstrated repeatedly during past wars and crises. US technological superiority can be maintained by continuing to invest in relevant research and development -- the nation has a vibrant private technological sector that can be drawn upon to support that R&D. Moreover, the large, well-educated US population offers a pool for military service that no other nation can duplicate in the near-term.

US conventional dominance is not uncontested. Russia and China are actively seeking to erode US military advantages, but remain unlikely to pose anything more than limited regional challenges to American conventional superiority, if that, for many years. Chinese investment in equipment modernization is paying off, but its modern military forces remain small and qualitatively inferior to those of the US. China does not today have the ability to contest the United States successfully, even in specific areas near US allies off China's coasts. Still, given its 20 years of investments in building a more modern military and continuing economic growth, China could plausibly threaten the United States' ability to conduct specific military actions in regions near China's coasts within the next several decades. If realized, such threats could jeopardize America's ability to fulfill its commitments to defend certain allies. But the realization of these threats is far from assured.

Few assert Russia will be able to contest US (and NATO) conventional military dominance within reasonable time horizons. Even if successful, Russian military reform efforts will likely take decades to produce a modern, professional force, as the Russian military largely remains an ill-trained conscript force reliant on older equipment. Those pessimistic about relative NATO/Russian conventional capabilities point out that the Russians have quantitative advantages in ground forces at several points along NATO's borders. Such calculations ignore the alliance's ability to move forces around during the crisis that would precede any conflict, as well as the inherent flexibility and mobility of NATO's superior air power. These scenarios also assume the United States and its allies will not act in the near future to overcome these dangers -- a position given lie by current efforts underway to strengthen NATO's on-the-ground capabilities in Northern Europe.

The Limited Role of Nuclear Weapons

Nuclear weapons remain indispensable in order to deter other nations from contemplating nuclear attacks on the US and its allies. Conventional forces are an inadequate deterrent for adversaries with significant nuclear forces, as they could not impose a comparable scale of destruction. Deterrence of nuclear attacks will always be a risky proposition, particularly during crises or wars, as it assumes informed and rational decision-makers, effective communications, and a host of other enabling conditions. Still, the fact that the US and Soviet Union generally behaved cautiously during the Cold War, when they each faced existential threats from the other's nuclear weapons, suggests nuclear threats do have deterrent value. At the same time, the

facts that non-nuclear states have been willing to attack and wage conventional war on nuclear powers, and that nuclear weapons have never been used since 1945, demonstrate the limited utility of these weapons in the real world, as opposed to the world of nuclear theoreticians.

Other than deterring nuclear attacks, nuclear weapons offer no advantage over conventional forces to the United States. The US can *defeat* any conventional attack on itself or its allies using conventional means. Even if a competitor challenged US conventional dominance in a particular situation and gained a temporary advantage, the US would be able to prevail conventionally over time by repositioning forces and, if necessary, drawing on its substantial demographic and economic resources. Because of this essentially absolute conventional defense capability, nuclear weapons add no further military advantage. Unlike every other major power, the United States does not have to rely on nuclear threats to defend itself from conventional attacks -- a tactic of weak states. In addition, for defending against unconventional attacks, such as the 9/11 attack, or the recent covert low-level military operations conducted by Russia in Ukraine, nuclear weapons are irrelevant.

Deterrence seeks to prevent adversaries from initiating attacks in the first place, instead of directly stopping them with military force, and clearly is preferable to *defense*. The United States' ability to defend itself and its allies successfully, combined with the capability to retaliate conventionally anywhere in the world, serves as a powerful deterrent against any conventional attack. Since US conventional capabilities are near absolute, nuclear weapons add no value to conventional threats. Moreover, since the US has used conventional forces repeatedly, but has not used nuclear weapons throughout the nuclear age, the deterrent threat of a conventional response is more credible than a threat of responding to conventional attack with a nuclear strike.

In the unlikely event that American security guarantees were disbelieved by an adversary and deterrence failed, it would be the result of a perception of insufficient American will, not insufficient American military capability. Threats to respond to conventional aggression with nuclear weapons would not enhance the credibility of American deterrence. If the United States were seen as unwilling to commit conventional forces to defend an ally, there is no reason to believe that threats to risk a nuclear war on an ally's behalf would be seen as more credible. Conversely, an adversary may believe it necessary to counter US conventional superiority with the threat or actual use of tactical nuclear weapons. US policy should make clear that crossing the nuclear threshold by any means -- with any type of warhead or weapon system, strategic or tactical -- would bring into play the possibility of a response from the United States' strategic nuclear arsenal.

Assurance is diplomacy, combined with the symbolic use of force, to persuade allies that US commitments to their security are sincere, credible, and that the nation is capable of fulfilling them. Allies, particularly officials charged with security in allied nation, always will harbor some

doubts about whether the United States would risk American lives to defend their sovereignty. Such doubts will wax and wane over time depending on the quality of relations between the US and its ally, perceptions of US strength and leadership, and events around the world—over most of which the US will have only limited influence.

Maintaining allies' confidence in US commitments requires frequent consultations, political reassurances, high-level meetings, and cooperation in military planning. US conventional forces also provide a global, visible, flexible, and credible means of reassuring allies -- particularly when they are deployed on the ally's territory or conduct temporary deployments to exercise jointly with allied forces. Though nuclear guarantees are an important component of US security commitments, allies doubt them more than they doubt US conventional commitments because of the greater risk they pose to the US homeland. If an adversary in fact attacked a US ally with conventional forces, the adversary would have already discounted the US commitment to defend the ally. And if US credibility had already been discounted, the potentially graver consequences of a nuclear response would make nuclear guarantees even less credible in the eyes of the adversary. Consequently, the US should make clear repeatedly that it will fulfill all of its treaty obligations and would respond conventionally to conventional attacks against allies, and with nuclear weapons in the event of nuclear attacks. The long history of US security commitments, and the sacrifices in blood and money which the American people have repeatedly made in defense of these commitments, provide ample evidence that US security guarantees are credible.

In recent years, some have argued that the United States should not restrict the purposes of its nuclear arsenal to deterring nuclear attacks, and instead threaten their use in response to a wider range of threats, such as attacks with chemical or biological weapons, cyber attacks that cause physical damage to important infrastructures, or efforts by states to provide terrorist organizations with nuclear weapons that would be used on US or allied territory through unconventional means (e.g., smuggled in a container).

Apart from questions about the efficacy of such threats, deterring them by threatening massive retaliation with conventional forces remains far preferable than broadening the stated role of nuclear weapons. Elevating the importance of nuclear weapons by widening their roles establishes precedents and perceptions of nuclear utility that can only encourage their emulation by others and result in vertical and horizontal proliferation. In contrast, the United States has the ability to respond to any of these threats with devastating conventional forces, thus achieving all the military utility without any of the political drawbacks.

By making clear that the US believes nuclear weapons can serve only to deter nuclear attacks, the US also would be helping to weaken perceptions of the importance of these weapons and to strengthen perceptions of the dangers they pose, thereby facilitating efforts to limit/reverse proliferation and reduce nuclear arsenals. In contrast, if the United States would make clear it relies on nuclear weapons for a larger set of roles, it legitimates these weapons, falsely draws attention to their potential uses, and thereby encourages nuclear proliferation. US threats to

respond to conventional attacks with nuclear weapons exaggerates the utility of nuclear weapons and could reinforce other states' inclination to acquire nuclear arsenals. If the US threatened with nuclear weapons despite its conventional superiority, other states with weaker conventional forces would have even more incentive to follow suit. The repetition of explicit threats to make the first use of nuclear weapons in a conflict could render such threats more credible and gradually weaken the taboo against the use of nuclear weapons.

Minimizing the Roles of Nuclear Weapons -- in US Policies and Those of Other Nations

Given this analysis of the single-purpose served by nuclear weapons in protecting the security of the United States and its allies, the US should orchestrate its diplomacy, nuclear declaratory policies, and force posture in order to minimize perceptions of the utility of nuclear weapons in world affairs. Among other things, such a policy would include: a) as political circumstances make possible, pursuing various types of negotiated arrangements that could lead eventually to a verifiable international regime that eliminated nuclear weapons from all nations; b) adopting declaratory policies that make clear the US belief in the narrow utility of nuclear weapons; and c) focusing its force structure solely on maintaining a secure, second-strike capability.

The primary objective of US policy on nuclear weapons should be the establishment of a verifiable international regime eliminating nuclear weapons globally. Since nuclear weapons only provide strategic value as a deterrent against nuclear use, while the potential effects of even a limited nuclear exchange could be devastating, US and global security would be enhanced substantially by the elimination of nuclear weapons from all nations. A functioning nuclear disarmament regime would better protect US interests than deterrence, as deterrence is inherently a risky and uncertain phenomenon. As long as nuclear weapons exist, their use is a possibility. Only by causing them to cease to exist can this possibility be ruled out.

Moreover, modern surveillance and reconnaissance capabilities and the long experience with US-Russian and multilateral arms control treaties demonstrate that verifiable regimes are possible. The risk of cheating under such a regime could be curtailed by creation of an international body charged with monitoring treaty compliance, backed by the power to impose punitive sanctions and the possibility of collective military action by the Treaty's signatories against nations that cheat or seek to break out of the agreement.

Of course, nuclear weapons will only be eliminated when underlying political conflicts among nations that have nuclear arsenals are resolved. Most important would be the achievement of understandings among Russia, the US, and the nations of Europe about Russia's role on the continent, and the political and economic integration of Russia into European affairs. A similar process concerning China's role in East Asia and its continuing economic and political integration into world affairs is also essential. As these broad international issues are worked out, however, processes that no doubt will take years, it would be possible to take steps towards

the establishment of a verifiable elimination regime. Such steps would include reducing the size of nuclear weapon stockpiles, beginning with those of the US and Russia, erecting tighter controls and more extensive monitoring procedures on civilian nuclear facilities and fuel cycles, developing and testing verification methods, particularly those pertaining to verifying limits on warheads (limits in existing treaties pertain mainly to weapon launchers), broadening and strengthening existing nuclear weapon free zones, strengthening the Non-proliferation Treaty, and developing common international understandings about the humanitarian consequences of nuclear use and the means through which nuclear disarmament might be achieved.

The US should refrain from the permanent forward-basing of nuclear weapons, which impose additional costs and risks and increase political tensions, without providing capabilities beyond those offered by US-based strategic forces. Instead, the US should assure allies of its nuclear deterrence guarantees by:

- maintaining (or establishing where they do not yet exist) standing consultative mechanisms with nations to whose defense we are committed to discuss threats to their security and plan on how to counter them jointly, including the nuclear component of such plans;
- frequently demonstrating the global reach of US nuclear capabilities through exercises, temporary deployments of bombers, and port visits by strategic submarines; and
- frequently demonstrating US conventional capabilities by temporary deployments of ground, air, and naval forces to allied nations for joint exercises.

By taking these concrete and practical steps, US nuclear policy and diplomacy can set a course for a truly secure future.

The second prong of US nuclear policy should rule out the use of nuclear weapons except as a response to others' use of nuclear weapons. US nuclear policy and doctrine should seek to strengthen the taboo against nuclear use by creating starkly clear boundaries that would raise the thresholds for nuclear use.

US declaratory policies should emphasize both the grave humanitarian consequences of nuclear use and the military disutility of nuclear weapons.

US nuclear policy and doctrine should state clearly that the US would not use nuclear weapons unless a nuclear weapon had already been used against the United States or one of its allies. Whatever marginal tactical or operational advantage the United States might gain from envisioning broader roles for nuclear weapons would not offset the greater negative consequence: Encouraging other states to look favorably on acquiring nuclear weapons and weakening the nuclear taboo.

At the same time, the United States must make clear beyond a shadow of a doubt that any nuclear attack on the United States or an ally under the United States' nuclear deterrence umbrella would be met with a nuclear counter-attack of equal or greater severity. A nuclear attack should be defined as any attack that incorporates a nuclear explosion, including an EMP attack, an attack with low-yield weapons, or an attack with weapons launched by short-range systems, no matter how few in number or limited in yield.

The US should reserve the option to respond to a tactical nuclear strike against in-theater conventional forces with the use of strategic nuclear weapons against tactical military targets, such as command and control nodes, large troop formations, or military bases. US policy should make clear that any step onto the nuclear escalation ladder could bring all of the capabilities of US strategic nuclear forces into play. Doctrine aside, in fact, the US might choose to respond to a very small, battlefield use of nuclear weapons with conventional forces. Such a response would further belittle the military utility of nuclear weapons. But such a decision would be a tactical choice that could only be made in the circumstances at the time. Although a logical possibility, such a battlefield option should not be stated explicitly as part of US doctrine in order to avoid weakening the perception that any nuclear use would prompt a US nuclear response, and thereby weaken deterrence of limited nuclear strikes.

Forces

Finally, reflecting the narrow role conceived for nuclear weapons, the US nuclear force structure should be focused solely on maintaining a secure second-strike capability. This focus would be reflected in the size, composition, and attributes of its nuclear forces, and their interactions with other non-nuclear, but strategic, capabilities.

In the 2020-2030 timeframe, the US should reduce its arsenal to roughly 1,000 deployed nuclear warheads, as counted under the rules of the New Start agreement, or to the size of the largest nuclear arsenal in the world, whichever is smaller. An arsenal of 1,000 deployed warheads would represent an approximately one-third reduction from current number of deployed warheads, as counted by the rules of New Start. A force of this size would be capable of inflicting massive devastation on any nation, thus constituting a more-than-minimal deterrent, leaving no doubt of the United States' ability to retaliate against a nuclear attack and continuing to provide extended deterrence for its allies. Although smaller, I believe the United States should maintain a strategic nuclear triad of ICBMs, submarines, and bombers. Illustratively, a 1,000-warhead force could consist of 300 ICBMs with single warheads, 10 ballistic missile submarines carrying missiles with 640 warheads, and 60 long-range bombers.

Additionally, the US should maintain a reserve of 1,000 non-deployed warheads to hedge against the degradation of operational warheads and the possibility of a nuclear crisis. While the United States should not reduce its forces below 1,000 deployed and 1,000 reserve warheads unilaterally, it should seek whenever possible to make further reductions through arms control treaties, with the ultimate goal of the global elimination of nuclear weapons.

Importance of the Strategic Triad

The US should seek to maintain the nuclear triad for as long as possible, even if agreements cause deployed forces to be reduced below 1,000 warheads, as each component provides unique attributes to the overall US nuclear deterrent.

ICBMs provide reliability, as they are based on tried-and-true technology and, unlike bombers that can be shot down, are extremely difficult to intercept. The wide geographical dispersion of ICBM silos and the fact that they are each equipped with one warhead also means that destroying one launcher in the event of a nuclear exchange would require at least one warhead. (In fact, as no missile can be expected to perform perfectly at all times, multiple warheads would probably be targeted against each silo.) This calculus strengthens the deterrence dynamic by casting into doubt an enemy's ability to preemptively destroy the US ICBM force without utilizing a large portion of its own forces. For decades to come, the US ICBM component could be composed of existing Minuteman III missiles, their components updated as needed with service-life extension programs or replacement parts, as this is the lowest-cost option. Reduction of the force from the START mandated 400 to 300 would also provide replacement parts and test missiles during this period.

Bombers offer flexibility. Unlike ICBMs and SLBMs that cannot be recalled once launched, bombers can be launched towards their target in a nuclear crisis and maintained near, but outside enemy air defenses, while political leaders sought to end the crisis without a nuclear strike. The bombers could be recalled should there prove to be a diplomatic solution or if the initial crisis was based on error, such as an erroneous interpretation of radar data. B-2s will remain the mainstay of the bomber fleet. If advances in Russian or Chinese air defenses raise doubts about the B-2s ability to penetrate to its targets, it should be equipped with a new, nuclear-capable cruise missile. B-52s, while aging, offer volume in the delivery of nuclear weapons. A new nuclear-capable cruise missile will be necessary to ensure the B-52s' continuing effectiveness. Development of the LRS-B next-generation bomber also should be a high priority, both for conventional and nuclear roles.

Submarines offer survivability when at sea. Whereas airfields and missile silos are stationary and easy to locate and target, US deployed submarines are extremely difficult to track reliably. This enhances the nuclear deterrent by reducing the enemy's confidence in its ability to avoid a

retaliatory strike. A force of ten *Ohio*-class and *Ohio*-replacement submarines, two below currently planned levels, should be sufficient. Reducing the purchase of *Ohio*-replacement submarines, which are very expensive platforms, also would ease long-term pressures on the Navy's shipbuilding budget.

Proponents of current *Ohio*-replacement building plans argue that a fleet of 12 submarines is the minimum necessary to meet (classified) nuclear coverage requirements. These requirements should be revised downwards, however, as the value of ballistic missile submarines lies more in their ability to survive a nuclear first strike than in their ability to retaliate immediately. So long as the submarines remain survivable, it is unnecessary to maintain a nuclear submarine fleet that is capable of holding all nuclear-armed adversaries at risk at any given time; some transit delay before a retaliatory strike would be acceptable.

Tactical Nuclear Weapons

The US should not modernize its tactical nuclear weapons, permitting them to be phased out at the end of their current lifetimes in the mid-2020s. The role currently presumed to be played by these weapons can be played by US strategic nuclear forces. Tactical nuclear forces offer no operational or strategic advantage as compared to either strategic nuclear forces or conventional forces, while generating significant costs for modernization and maintenance, and for the training and certification of flight crews and aircraft. Implementing this recommendation means cancelling plans to extend the lifetimes of tactical versions of the B-61 bomb and cancelling the planned development of a nuclear delivery capability for the F-35 -- a savings of perhaps \$8 billion over the next ten years.

Other Strategic Technologies

While the US should continue to invest in other technologies with potential strategic implications, such as cyber warfare, electronic warfare, and conventional global strike, these technologies do not supplant the need to maintain a nuclear deterrent as long as other states maintain nuclear arsenals.

The US should continue investing in conventional global strike systems, including research into hypersonic weapons, as they promise enhanced tactical options for conventional responses to attacks, crises, or provocations. As missile defense systems are likely to remain limited in their ability to defeat an attack by any sizeable ballistic missile arsenal, there is no need to develop nuclear-capable hypersonic weapons.

The United States should ardently pursue missile defense technologies at both the theater and national levels. As technology permits, the US should deploy theater missile defenses in or near

allied nations that can protect against, or at least limit the damage from, attacks by small nuclear forces. The US should continue to develop incremental improvements to existing theater missile defense systems, such as the THAAD and SM-3 systems. Investment also should be continued in potentially breakthrough missile defense technologies, such as laser technology, that conceivably could reverse the existing cost imbalance between offensive and defensive capabilities.

The US also should pursue a robust research and development program for national missile defense, but stop short of fielding additional continental-based systems until new technologies prove to be effective. The United States should freeze the Ground-Based Missile Defense program and redirect funding to R&D efforts. The US should not field additional or replacement interceptors at existing West Coast sites, and certainly not develop a new site on the East Coast, until developmental versions of the interceptors achieve consistent success under real-world conditions, including the ability to distinguish incoming warheads from debris or chaff or decoys.

The US should maintain a stockpile maintenance program to ensure that US nuclear weapons are safe, effective and reliable, and a nuclear infrastructure of sufficient capability to repair or, if necessary, replace warheads and delivery systems as required. Although the aging of existing warheads may at some point require the fabrication of new warheads, any new warheads should be designed following an extremely conservative approach that provides higher margins of error without adding new capabilities to existing designs.

A conservative design approach not only would send a strong message about the disutility of these weapons but also provides a high degree of confidence in warheads' reliability without resuming nuclear testing. Since nuclear weapons should be used only as a strategic deterrent with an extremely high threshold for use, any new or overhauled warheads should be relatively high-yield warheads, like those now deployed on Trident and Minuteman missiles. Bomber weapons might be designed with variable yields so that they could be used in response to the use of tactical weapons on battlefields without excessive collateral damage. Other design features that might present hope of making nuclear weapons more "useable," such as extremely low yields, electromagnetic pulse, or neutron bomb designs, should not be incorporated as they would present the appearance that the US shares others' claim that limited nuclear wars could be fought without catastrophic consequences.

The US should maintain effective warning and command and control systems, including space-based systems that are protected against disruption by cyber or electronic warfare or by physical interception. This goal can be furthered by investing in hardening, redundancy, and defensive measures, as well as by developing lower cost space launch capabilities, provided by several launcher manufacturers, to make possible the rapid replacement of disabled satellites.

The US should invest research and development funds in methods to protect command and control systems, especially satellite systems, from physical attack, as demonstrated by China's shoot-down of one of its own satellites, and electronic disruption, as might result from the use of an EMP weapon. Hardening, however, cannot be expected to prevent any and all disruptions, and hardened systems should be developed and fielded with a high sensitivity to cost-effectiveness.

Redundancy applies not only within warning and C2 systems but also across systems. The US should ensure that any given system, such as communications or GPS satellites, are redundant enough (i.e. numerous enough) that the system as a whole can still function even if a significant fraction of those satellites were destroyed or otherwise incapacitated. At the same time, command and control and targeting capabilities must be layered across different systems to ensure that nuclear second strike capabilities could not be severely degraded or eliminated by the failure of any one given system. For example, satellite communications should be layered with ground-based radio and telephone communications and, potentially, even physical courier systems, all supported by appropriate command and control protocols, while ensuring that all nuclear systems continue to incorporate secondary inertial navigation systems.

Finally, the US should invest R&D funds in the creation of active defensive capabilities for satellites critical to nuclear command and control, while shifting the emphasis of cyber warfare programs towards developing more robust defenses against cyber attacks. Defensive measures for key satellites might include the ability to maneuver, deploy decoys, and potentially even employ limited missile defenses. These missile defenses would only be designed to be capable of intercepting missiles targeted at the satellite and might include hit-to-kill and, in a more distant timeframe, laser-based systems.

Conclusion

Nuclear weapons do not achieve US policy objectives, dominant conventional forces do. The US interest lies in seeking to minimize the importance accorded to nuclear weapons by narrowing the roles they are perceived to play. US doctrine, policy, forces, and diplomacy should all be configured to support this interest. The posture described in this paper achieves just that, in contrast to postures that imagine uses of nuclear weapons that have never actually been demonstrated. After seventy years of indulging fantasies of what nuclear weapons can do, it is high time to acknowledge that they do very little and adapt US nuclear policy, strategy, and forces to those facts.

Barry Blechman
Co-Founder, Stimson Center

Dr. Barry M. Blechman is the Co-Founder of the Stimson Center, a nonpartisan think tank based in Washington DC focused on issues of national and international security. He was also the founder and president of DFI International Inc., a research and consulting company in Washington, DC, until its sale in 2007. Blechman has more than 40 years of distinguished service in the national security field. An expert on political/military policies, military strategy, and defense budgets and industries, he has worked in the Departments of State and Defense and at the Office of Management and Budget, and is a frequent consultant to the US Government on a wide range of subjects. Among other boards and commissions, Blechman served on the Commission to Assess the Ballistic Missile Threat to the United States (1998-99), the Defense Policy Board (2002-06), and the Mayor's Bioterrorism Preparedness and Response Program Advisory Committee in the District of Columbia (2004-06). He is currently a member of the Department of State Advisory Committee on Transformational Diplomacy. A Georgetown Ph.D. in international relations, Blechman has written extensively on national security issues and has taught at several universities.

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COMMITTEE ON ARMED SERVICES
U.S. HOUSE OF REPRESENTATIVES**

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Witness name: Barry Blechman

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2015

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
None			

2014

Federal grant/ contract	Federal agency	Dollar value	Subject of contract or grant
None			

2013

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None			

2013

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None			

Future Options for the U.S. Nuclear Deterrent

Prepared statement of Dr. Adam Mount

Testimony before the House Armed Services

Strategic Forces Subcommittee

2212 Rayburn House Office Building

3 November, 2015

Chairman Rogers, Ranking Member Cooper, distinguished members of the subcommittee, thank you for the invitation to testify before you today on this important subject.

The world is entering a period of strategic competition. Since the end of the Cold War, the United States has been primarily concerned with confronting insurgency, terrorism, and ethnic violence. However, Russia's aggression against Ukraine and the expansion of China's territorial claims in the South China Sea require the military to refocus its attention to major power competition. The United States must again prepare to contain, deter, and, if necessary, defend its allies against advanced militaries.

However, the return of strategic competition does not mean we are in "a new Cold War." The challenges of the coming decade are militarily and geopolitically different from the Soviet threat. Neither Russia nor China possesses the military or economic resources to compete with U.S. influence globally; instead, the challenge is one of maintaining stability in regional contexts and defending the core interests of U.S. allies against limited but persistent encroachment. There is little evidence that Russia or China is looking to surpass U.S. nuclear advantages, or that they could if they wanted to.

Both Russia and China are engaged in extensive but moderate programs to modernize their nuclear arsenals. Though these programs will cause minor perturbations in the strategic balance, none of them constitutes a major threat to the security of the United States. With a few notable exceptions, modernization programs in Russia and China are simple replacements of legacy systems that have reached the end of their service lives. Other programs, including the submarine programs of both countries, are efforts to compensate for major deficiencies in survivability and readiness. For the foreseeable future, both arsenals will remain markedly less capable than U.S. nuclear forces. For example, neither country is engaged in a serious effort to replace its non-stealthy legacy aircraft for delivery of both gravity bombs and air-launched cruise missiles. Reflecting these strategic realities, a 2012 Pentagon report concluded that Russia "would not be able to achieve a militarily significant

advantage by any plausible expansion of its strategic nuclear forces, even in a cheating or breakout scenario under the New START Treaty.”¹

The United States is in the enviable position of moving second in this round of strategic modernization. However, there is a real danger that U.S. modernization plans could generate new strategic concerns among its adversaries and provoke increased competition. Recently, there have been calls to build new nuclear capabilities and to deploy them closer to potential zones of conflict. These proposals represent a dramatic departure from the bipartisan consensus on nuclear policy that has stretched back to the 1980s. They underestimate the diplomatic and strategic costs of initiating new programs and overestimate the utility of nuclear weapons in confronting hybrid threats to U.S. allies. Existing plans to modernize the U.S. nuclear arsenal already place severe stress on the Pentagon budget and on the international system; exceeding these plans by seeking new capabilities is inadvisable. Most importantly, new nuclear capabilities would likely exacerbate perceived vulnerabilities in both Russia and China, causing them to accelerate and expand their own modernization programs and to behave erratically in a crisis.

Stability concerns

New nuclear weapons are unlikely to be effective tools for deterring or confronting new strategic challenges. Both Russia and China have adopted sophisticated strategies to gain territory by means of operations that remain below the threshold of war. Russia in particular seeks to cover this low-level aggression by issuing reckless nuclear threats. Nuclear weapons, no matter how small and no matter where they are stationed, cannot deter this kind of hybrid aggression. U.S. nuclear threats cannot help to roll back Russian occupation of Crimea or put a halt to Chinese land reclamation projects in the South China Sea. It is simply not credible to issue a nuclear threat in these circumstances.

It is far from certain that low-yield and special effects nuclear warheads are necessary to control escalation. It is not clear why or when a low-yield nuclear weapon would deter an adversary if the nation's strategic arsenal cannot. Similarly, there is little evidence to assure us that an adversary is less likely to retaliate against U.S. employment of a relatively lower yield nuclear weapon or one with a special effect or delivery method. As Deputy Secretary of Defense Robert Work recently warned Russia, “Anyone who thinks they can control escalation through the use of nuclear weapons is literally playing with fire.”²

¹ U.S. Department of Defense, “Report on the Strategic Nuclear Forces of the Russian Federation...,” 2012, available: http://fas.org/programs/ssp/nukes/nuclearweapons/DOD2012_RussianNukes.pdf.

² David Alexander, “Russia ‘playing with fire’ with nuclear saber-rattling: Pentagon,” *Reuters*, 25 June, 2015, available: <http://www.reuters.com/article/2015/06/25/us-usa-nuclear-arms-idUSKBN0P52FC20150625>.

The case for procuring new tactical nuclear weapons relies on the belief that the United States can more credibly threaten to employ them. Utilizing any type of nuclear weapon—whether by providing release authority to a NATO ally or to an U.S. operator—would incur tremendous costs. It could provoke a wider nuclear exchange, complicate ongoing military operations, acquiesce to an enemy's desperate gamble to escape a disadvantageous situation, strain or fracture U.S. alliances, distract attention from an adversary's aggression, increase the likelihood that other countries pursue and utilize a nuclear weapon in similar ways, and damage U.S. standing around the world. These considerations raise the cost of pursuing, threatening to use, or using tactical nuclear weapons, which in turn decreases their utility as instruments of deterrence.³

To increase reliance on nuclear weapons in limited contingencies would only support Russia's effort to shift the strategic competition to the nuclear domain (where it is relatively strong) and away from conventional competition (where it is relatively weaker). The United States has no interest in encouraging competition at the nuclear level and every interest in resisting Russian aggression by cooperating closely with U.S. allies to apply diplomatic and military pressure specifically tailored to the threat. New nuclear deployments could increase tensions between NATO and Asian allies that would accept new systems and the many that would resist them. At the same time, they could detract attention, resources, and resolve from the need to quickly and decisively respond to low-level provocations.

While new nuclear capabilities are unlikely to deter hybrid threats in this new environment, they could instead significantly contribute to instability. New procurement efforts would likely accelerate Russia and China's modernization efforts, contributing to what former Secretary of Defense Bill Perry recently warned is "a new round in the nuclear arms race."⁴ In the context of U.S. conventional superiority, adversary countries have persistent and justified concerns about the survivability of their nuclear forces. Increasing emphasis on tactical nuclear weapons would blur the line between conventional and nuclear forces and exacerbate these concerns. This in turn could encourage U.S. adversaries to pursue new capabilities in an attempt to ensure the survivability of their nuclear forces and their ability to hold U.S. interests at risk.

It is neither a feasible nor a desirable goal for the United States to seek escalation dominance over nuclear-armed adversaries (with the exception of North Korea). Instead, perceived imbalances and vulnerabilities should be addressed through verifiable arms control agreements. In order to stabilize the strategic balance for the next decades, the United States should press Russia to engage in negotiations to

³ For more, see Adam Mount, "The strategic logic of nuclear restraint," *Survival* 57 (5), 2015 and Adam Mount, "Questioning the case for new nuclear weapons," *Bulletin of the Atomic Scientists*, 21 August, 2015, available: <http://thebulletin.org/questioning-case-new-nuclear-weapons8671>.

⁴ Jonathan Tirone, "Vienna Forum Hears Warnings of a New U.S.-Russia Nuclear Arms Race," 24 June, 2015, available: <http://www.bloomberg.com/news/articles/2015-06-24/u-s-risks-weapons-race-as-russia-adds-warheads-senate-stalls>.

limit not only the existing arsenals but also the procurement programs that each party considers destabilizing.⁵

Fiscal concerns

The United States is starting a comprehensive effort to modernize its nuclear arsenal. In the next decades, nearly every bomber, submarine, missile, and warhead in the arsenal is set to be refurbished or replaced. Non-governmental estimates place the total cost of the nuclear triad between \$800 billion and \$1.1 trillion over the next thirty years (depending on cost growth and the programs included).⁶ This outlay represents a significant challenge for the nuclear enterprise.

The overwhelming trend in major defense acquisition programs is for Congress to pare back the services' requests for large inventories of advanced systems, a trend which is likely to be repeated with the current nuclear modernization plans. If history is any precedent, Congress is unlikely to obligate funds for 100 new bombers and 12 new Ohio replacement submarines on top of numerous other outlays. However, unlike the last modernization cycle of the 1980s, U.S. arsenal today is not so large that it can absorb large cuts to planned systems with little effect on nuclear strategy. Cuts to the core systems of the triad will require changes to nuclear operations, including on-station requirements for submarines and changes to how warheads are distributed across the triad.

Nuclear modernization plans also place significant pressure on other military priorities. Every dollar spent on nuclear modernization constrains other programs, including maintaining the size of the U.S. Army and the Navy's surface fleet, procurement of a new generation of attack submarines and aircraft carriers, and the F-35 program.

Though the services will and should endeavor to maximize the options they can provide to the president in a crisis, fiscal constraints require that Congress and the White House make hard choices between conflicting priorities. The United States should prioritize the systems that are most important for deterrence—a replacement for the Ohio ballistic submarines and a new bomber platform—while making prudent cuts to the modernization plans. Congress should require the Department of Defense to generate a study that explains the necessity of the cruise missile as well as aggregate estimates of all nuclear items in the 050 account. In this highly constrained fiscal environment, the government should certainly resist calls to launch new programs for niche capabilities.

⁵ This proposal is described at length in Adam Mount, "Time for a different kind of U.S.-Russian arms control," *Bulletin of the Atomic Scientists*, 27 October, 2015, available: <http://thebulletin.org/time-different-kind-us-russian-arms-control8829>.

⁶ Todd Harrison & Evan Braden Montgomery, "The Cost of U.S. Nuclear Forces," Center for Strategic and Budgetary Assessments, 2015 and Jon Wolfsthal, Jeffrey Lewis, and Marc Quint, "Trillion Dollar Triad," James Martin Center for Nonproliferation Studies, 2014.

Broader concerns

The costs of seeking new nuclear capabilities are not only monetary. The global nuclear order is at a precarious juncture. The Nuclear Nonproliferation Treaty (NPT), the cornerstone of the complex system of international institutions that govern the nuclear world, is at risk. Under the treaty, nonnuclear states commit not to pursue nuclear weapons as long as the nuclear states move toward disarmament. This year's Review Conference failed to reach consensus on steps to limit nuclear risk and nuclear proliferation, in part because the modernization efforts of the nuclear weapon states have caused some nonnuclear states to question whether this bargain is still sound.

Reneging on the U.S. commitment not to build new nuclear capabilities could stress the NPT to the breaking point, throwing the nuclear order into disarray and depriving the United States of important nonproliferation tools. A new effort to build tactical weapons would be a clarion signal to the world that nuclear weapons are necessary instruments of national defense and effective tools for controlling escalation. To seek low-yield nuclear weapons on the grounds that they are more "usable" would encourage other states to adopt the same logic and pursue the same capabilities.

It is far safer to maintain that nuclear weapons are not an effective means of controlling escalation. The United States should rely on its superior conventional systems and do all it can to avoid blurring the bright moral and prudential line between nuclear and conventional war.

In conclusion, current and projected strategic conditions do not warrant major changes to longstanding nuclear force structure. It is critical to national security and the country's standing in the world that the United States maintain its commitments not to seek new nuclear capabilities and to continue gradual reductions of its nuclear arsenal. In order to provide the services with realistic and rational guidance for deterrence operations through the entire modernization cycle, Congress and the White House should pursue prudent cuts to the current modernization plans that protect core priorities. Destabilizing systems should be limited through verifiable arms control agreements.

Dr. Adam Mount Biography

Dr. Adam Mount is an independent consultant in Washington, DC, including as Project Director of the Independent Task Force on North Korea at the Council on Foreign Relations. Prior to this, he was a Stanton Nuclear Security Fellow at CFR and also worked briefly on nuclear elimination contingencies at the RAND Corporation. Dr. Mount's writing has been published by *Foreign Affairs*, *Survival*, *The National Interest*, *Democracy*, and other outlets. He also writes a column on nuclear strategy and force structure at *the Bulletin of the Atomic Scientists*. He holds a Ph.D. in Government from Georgetown University.

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Witness name: Adam Mount

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DOCUMENTS SUBMITTED FOR THE RECORD

NOVEMBER 3, 2015

Executive Summary

Clark Murdock

Center for Strategic and International Studies

Project Atom took a competitive strategies approach to its zero-based, “blue-sky” review of U.S. nuclear strategy and force posture. Three independent think tank teams—the Stimson Center, the Center for a New American Security (CNAS), and the National Institute for Public Policy (NIPP)—addressed the fundamental issues:

- What should U.S. nuclear strategy be for the new era, defined as 2025–2050?
- What U.S. nuclear posture is needed to support that strategy?

Their analysis (which can be found in the appendices of this report) was unconstrained by current strategy (e.g., reducing the role of nuclear weapons in U.S. strategy) and current policy (e.g., the prohibition against new nuclear weapons or new nuclear capabilities), but was conducted within a common framework of assumptions about the future security environment, likely technological trends, and resource constraints. After leading the development of the common analytic framework and participating in the debate among the think tank teams, I drafted a recommended nuclear strategy and posture for 2025–2050, defended it at a half-day Project Atom working group meeting, consulted with additional experts, and drafted the study report. The competitive strategies approach, including the use of external (to the think tank teams) experts, was extremely helpful as I developed and refined my recommended nuclear strategy and posture. Although many authors contributed to the Project Atom study effort (their work is included in the appendices), I am solely responsible for the views expressed in the main text of this final report.

2025–2050: Recommended U.S. Nuclear Strategy

The recommendations made here are based on two related propositions about what would occur *in the absence* of an effective U.S. nuclear strategy to counteract these trends:

- The dynamics of the 2025–2050 security environment will cause further nuclear proliferation—perhaps not to the 18 nuclear powers envisioned in an alternative future, but higher than the 9 to 11 nuclear powers of the 2030 and beyond (2030+) “Likely Future” assumed by the think tank teams.

- The credibility of U.S. extended deterrence, as well as the assurance that U.S. allies and friends derive from it, will decline significantly in 2025–2050, in part because of the failure to prevent further nuclear proliferation.

A major stimulus for a faster rate of nuclear proliferation is U.S. conventional military superiority. This causes nonnuclear nation-states (such as North Korea, Iran, Iraq, Syria, and Libya) to pursue nuclear weapons as a counter or offset to U.S. military prowess. It also leads nuclear-armed states with interests in opposition to the United States (Russia, for sure, but perhaps China) to increase their reliance on nuclear weapons, much in the way that the United States did during the Cold War. Although the margin of U.S. conventional superiority has never been as great as often proclaimed and is declining relative to other major powers, the prospect of a conventional-only war with the United States is a losing proposition for any state. The value of nuclear weapons as a “trump card” for negating U.S. conventional power was enhanced by the U.S. invasion of Iraq in 2003 to prevent Saddam Hussein from acquiring a nuclear weapon. If the United States apparently believes that it can be deterred by an adversary’s nuclear weapons, why wouldn’t a nonnuclear “regional rogue” want one?

More nuclear-armed regional adversaries (to the United States and its allies) and increased reliance on nuclear weapons by major powers in competition with the United States will lead U.S. nonnuclear allies to rely more on U.S. extended nuclear deterrence. However, the credibility of U.S. extended deterrence will have been weakened by the failure of U.S.-led efforts to prevent the nuclear proliferation that led to the increased demand from its allies for help in deterring nuclear-armed adversaries. This vicious cycle is likely to continue *unless* the United States moves forcefully to counter it, which, in my judgment, requires a U.S. nuclear strategy designed for twenty-first century realities. Adoption of the recommended strategy could limit projected nuclear proliferation to the greater Middle East and prevent it from spreading to Northeast Asia, Europe, and elsewhere.

DISCRIMINATE NUCLEAR OPTIONS

The scenarios for nuclear employment have changed greatly since the “balance of terror” between the two global superpowers. In “the second nuclear age,” potential U.S. adversaries are thinking through how they might actually employ a nuclear weapon, both early in a conflict and in a discriminate manner, to get the United States to “back off” in a conflict. U.S. nuclear forces were designed for a global conflict involving the exchange of thousands of high-yield weapons, not limited exchanges of low-yield weapons. Since most U.S. nuclear response options are large, “dirty,” and inflict significant collateral damage, the United States might be “self-deterred” and not respond “in kind” to discriminate nuclear attacks. U.S. conventional superiority establishes escalation control for the United States at the conventional level and causes its adversaries to think about breaking the nuclear threshold. The United States needs discriminate nuclear options at all rungs of the nuclear escalation ladder to make that option unattractive as well.

FORWARD-DEPLOYED U.S. NUCLEAR WEAPONS

“Coupling” U.S. security to the security of its allies was always a huge challenge during the Cold War. Although U.S. nuclear strategy and employment policy changed from massive retaliation to flexible response, it was the presence of 7,000 U.S. nuclear weapons in Europe that ensured that any major conflict in the European region would escalate rapidly to nuclear war. And the United States deployed hundreds of nuclear weapons in South Korea (and about 3,000 nonstrategic nuclear weapons in the Pacific region) to underscore its extended deterrence commitments there. This encirclement by forward-based U.S. nuclear weapons worked during the Cold War and was largely dismantled after the Cold War ended.

When security anxieties are acute, “reassurance” or “assurance” is most reliably provided by credible extended deterrence—if the adversaries of American allies are deterred, the allies will be assured. Deterring regional adversaries from “going nuclear” requires credible nuclear responses to their nuclear attack options. Forward deploying a robust set of discriminate nuclear response options conveys the message that the United States will “respond in kind” and proportionately to nuclear attacks on its allies. The credibility of that message is reinforced because the U.S. homeland would not be engaged in the U.S. response to a nuclear attack on a regional ally, which leaves the burden on the regional aggressor to escalate to the level of “homeland exchanges.” The price, however, for this more credible U.S. “nuclear umbrella,” is likely to be the ally’s willingness to host U.S. nuclear weapons. This is what will constitute “nuclear burden sharing” in 2025–2050.

The nuclear strategy being recommended here is called “Measured Response.” This is not a new strategy; it is grounded in the U.S. strategy of escalation control that evolved as the United States turned away from the “massive retaliation” strategy of the 1950s and adopted “flexible response.” It’s about ensuring that there are no gaps in U.S. nuclear response options that would prevent it from retaliating proportionately to any employment of a nuclear weapon against the United States and its allies. U.S. conventional superiority lowers the nuclear threshold because it tempts conventionally weaker adversaries to early (rather than as a last resort) employment of a nuclear weapon in order to avoid adverse results at the conventional level. By having a robust set of proportionate nuclear responses, the United States raises the nuclear threshold because it reduces the attractiveness of nuclear escalation. This may seem paradoxical, to be sure, but paradoxes seem to be endemic to any nuclear age.

2025–2050: Recommended Nuclear Posture

As it shapes its nuclear forces for coping with 2025–2050 realities, the United States needs to address its inferiority (with Russia) in nonstrategic nuclear forces (NSNF, but also known as “tactical nuclear weapons” or TNWs) by developing a robust set of discriminate nuclear options and forward-deployable nuclear weapons. While I do not believe that the United

States needs to match Russia quantitatively, I do believe that Russia's qualitative superiority in NSNF does undercut the proposed Measured Response strategy.

The two primary missions for U.S. nuclear weapons are deterrence and extended deterrence, and the future force should be structured accordingly. In order to execute its Measured Response strategy, the nuclear forces for both deterrence and extended deterrence should have low-yield, accurate, special-effects options that can respond proportionately at the lower end of the nuclear continuum.

- *Strategic deterrent force (SDF)*, consisting of *Ohio*-replacement class submarines, Minuteman III ICBMs (or a follow-on ground-based strategic deterrent [GBSD]) and B-52s and B-2s (and a new nuclear-capable bomber at some point), is the highly survivable, assured destruction force that is the foundation on which U.S. nuclear deterrence resides. This is the “strategic triad” that deterred the Soviet Union during the Cold War and it provides the United States its “nuclear shadow.”
- Discriminate employment options, delivered both by gravity bombs and a new cruise missile, would be provided by the same suite of air-delivered discriminate warheads used for extended deterrence.
- *Extended deterrent force (EDF)*, consisting of forward-based and rapidly deployable dual-capable aircraft would enable both permanent and temporary “coupling” of the U.S. nuclear deterrent to host-nation security.
 - Dual-capable F-35As (based on land) and F-35Cs (based on carriers) would provide visible manifestations of U.S. extended deterrence and allied burden sharing.
 - Discriminate employment options would be provided by a suite of low-yield, special-effects warheads (low collateral, enhanced radiation, earth penetration, electromagnetic pulse, and others as technology advances), including possibly a smaller, shorter-range cruise missile that could be delivered by F-35s.

In this recommended 2025–2050 nuclear posture, bombers serve as an all-purpose hedge force that can enable, complement, and hedge for the other three “legs” (submarine-launched ballistic missiles [SLBMs], intercontinental ballistic missiles [ICBMs], and dual-capable F-35s). They provide extended-deterrence presence and discriminate nuclear options in regions where there are no forward-based or deployed F-35s. They can also provide weapons and mobility to deploying F-35As. As the traditional complement to SLBMs and ICBMs in the SDF, bombers are the most flexible leg of the strategic triad and can be used for signaling.

The time frame 2025–2050 is too far into the future to project specific numbers. However, the following are offered as guidelines for sizing the future U.S. nuclear force:

- Maintain rough parity with Russia.
- Maintain nuclear superiority over China.

- Maintain sufficient capability to cope simultaneously with nuclear-armed “regional rogues.”
- Maintain a smaller stockpile, which is enabled by a responsive infrastructure.

The capabilities envisioned for this recommended nuclear posture include weapons intended to deter discriminate nuclear attacks at the lower end of the nuclear continuum; forward-based and forward-deployable delivery systems intended for extended deterrence, and assured destruction weapons that have intercontinental range, larger payloads, and are deployed in numbers sufficient to ensure stability and survivability. These are the right capabilities for nuclear deterrence in the twenty-first century because they counter the “nuclear offset” that U.S. adversaries might adopt for coping with U.S. conventional superiority.

Project Atom: A Competitive Strategies Approach to Defining U.S. Nuclear Strategy and Posture for 2025–2050

Clark Murdock

Center for Strategic and International Studies

Study Objective

The end of the Cold War and the 9/11 terrorist attacks on the U.S. homeland have profoundly changed the global security environment and reordered U.S. security priorities. During the Cold War, sometimes characterized as “the first nuclear age,” the United States and the Soviet Union engaged in a nuclear arms race as each side pursued massive nuclear arsenals sized and shaped to fight nuclear wars with each other.¹ Nuclear issues were deemed so important that the U.S. nuclear deterrent was often characterized as its *strategic* deterrent, because it was the primary strategy for coping with the existential threat posed by Soviet nuclear weapons. Today, the threat posed to the United States by nuclear-armed nation-states is not even the top-ranked nuclear danger, as the 2010 Nuclear Posture Review (NPR) report elevated nuclear terrorism and nuclear proliferation as more important challenges.² Today, the American policy community pays little attention to U.S. nuclear strategy and posture, as the nuclear mission itself has become a neglected backwater in the defense establishment and draws attention only when mistakes and scandals occur.

This loss of saliency for U.S. nuclear strategy and capabilities was clearly demonstrated at the end of George W. Bush's administration when Congress refused to fund the Reliable Replacement Warhead (RRW) despite a last-minute campaign by the secretaries of Defense and Energy. While the role of nuclear weapons in U.S. security policy has clearly declined since the Cold War, reducing it further did not become official policy until President Obama, in his April 2009 Prague speech, committed the United States to the long-term pursuit of a world without nuclear weapons.³ Although President Obama has stated

1. Paul Bracken, *The Second Nuclear Age: Strategy, Danger and the New Power Politics* (New York: Times Books, 2012).

2. U.S. Department of Defense (DoD), *Nuclear Posture Review Report* (Washington, DC: DoD, 2010).

3. The White House, “Remarks by President Barack Obama, Prague, Czech Republic,” April 5, 2009, https://www.whitehouse.gov/the_press_office/Remarks-By-President-Barack-Obama-In-Prague-As-Delivered.

repeatedly (both in his Prague speech and since) that the United States must maintain a “safe, secure, and effective” nuclear force for “as long as nuclear weapons exist,” he also stated in June 2013 that the United States will never be “truly secure” as long as nuclear weapons exist.⁴ Given the presidential-level commitment to reduce the role of nuclear weapons, it is not surprising that there has been little serious attention, much less national debate, about U.S. nuclear strategy and posture in what Paul Bracken has characterized as “the second nuclear age”—that is, a world in which regional rivalries, sectarian conflicts, and competitions for resources (to name only a few) occur “in a nuclear context” because they increasingly involve states armed with nuclear weapons.⁵ Today, the United States pursues a strategy that is anchored in Cold War concepts and seeks to sustain a smaller version of the nuclear posture that supported its Cold War strategy. Almost by definition, this is not the right posture for the second nuclear age. Looking ahead to the 2017–2018 NPR process, Project Atom launched a zero-based, “blue sky” review of U.S. nuclear strategy and force posture that addressed the fundamental issues:

- What should U.S. nuclear strategy be for the new era, defined as 2025–2050?
- What U.S. nuclear posture is needed to support that strategy?

This “clean slate” review was predicated on the assumption that the vision of a world without nuclear weapons is *not* feasible for the foreseeable future. It was unconstrained by current strategy (e.g., reducing the role of nuclear weapons in U.S. strategy) and current policy (e.g., the self-imposed prohibition against new nuclear weapons or new nuclear capabilities). However, it was constrained by likely technological trends and the affordability of nuclear modernization (approximately \$35 billion per year in constant 2013 dollars, comprising 4–5 percent of the defense budget). In the effort to generate new thinking about first-order questions, Project Atom followed a competitive strategies approach, which the CSIS study team modified during its execution.

Methodological Approach

The “competitive strategies” approach adopted by Project Atom had two intellectual foundations:

- At the beginning of his first administration, President Dwight Eisenhower established Project Solarium, which created three independent teams that were chartered to develop alternative versions of his predecessor’s containment strategy and then present them to the new president’s national security team.⁶ After participating in (and listening to) the debate, Eisenhower chose a less-aggressive

4. The White House, “Remarks by President Obama at the Brandenburg Gate—Berlin, Germany,” June 19, 2013, <https://www.whitehouse.gov/the-press-office/2013/06/19/remarks-president-obama-brandenburg-gate-berlin-germany>.

5. Bracken, *Second Nuclear Age*, 245.

6. Michèle A. Flournoy and Shawn W. Brimley, *Strategic Planning for U.S. National Security: A Project Solarium for the 21st Century*, Princeton Project Papers (Princeton, NJ: Woodrow Wilson School of Public and International Affairs, September 2006), <http://www.princeton.edu/~ppns/papers/interagencyQNSR.pdf>.

containment (vs. rollback) strategy of communism that emphasized American economic strength and “more bang for the buck” reliance on the nuclear (vs. conventional) force.

- In early 2013, the Center for Strategic and Budgetary Analysis (CSBA), under the leadership of Todd Harrison, conducted a military portfolio “rebalancing exercise” in which small analytic teams from three Washington-based think tank teams (the author led the CSIS team) “rebalanced” the U.S. military as it was reduced to fit under the budgetary ceilings established by the Budget Control Act of 2011.

Project Atom fused these into a hybrid approach that envisioned a series of largely sequential steps:

1. Identify and recruit three “think tank teams” that cover the broad middle of the spectrum of opinion, each led by a well-known expert in nuclear strategy and posture (see Appendix A for the list of Project Atom participants and Appendix B for Project Atom timelines).
2. Identify and recruit five to six external (to the think tank teams) subject-matter experts (SMEs) who would participate in the working group meetings and provide additional feedback on Project Atom products (see Appendix A).
3. Establish a common framework to ensure that each think tank team would address the same issues and would be using similar assumptions.
 - a. “Template and Framing Assumptions for Think Tank Team Papers” (Appendix H)
 - b. “Technological Possibilities for Nuclear Weapons in 2025–2050” (Appendix I)
 - c. “Adversary Nuclear Strategies: 2030+” (Appendix J)
 - d. “2030+ Security Environment: The ‘Likely Future’ and Several Alternative Worlds” (Appendix K)
4. Operating independently from one another, each think tank team produced a detailed statement (17 to 23 pages) of its views and then presented it in a daylong working group session on 11 August 2014.
 - a. After the working group discussion, each think tank team had the opportunity to revise its paper, which are included in final form at Appendix C (Stimson Center), D (CNAS), and E (NIPP).
5. Dr. Clark Murdock drafted his statement, circulated it to the working group, and defended it at a 22 October 2014 half-day working group meeting.
 - a. As stated at the outset, the 17 October 2014 paper was “decidedly NOT an effort to synthesize or integrate the positions” expressed in the think tank team papers but “represent[ed] the best judgment, reached after the Project Atom competitive strategy exercise and an informal vetting process, of Clark Murdock as to what U.S. nuclear strategy and force posture should be in 2025–2050.”

- b. This 17 October 2014 paper also “use[d] stark, deliberately simplified language, with little nuance, hedging language and obfuscation that often characterizes discussion of nuclear strategy and policy.”
 - i. In retrospect, this was a mistake, because the language in which an idea was expressed was sometimes so incendiary that it was counterproductive and undermined the persuasiveness of the argument. This failed experiment in ignoring any “PC standards” in “thinking about the unthinkable” led to my *not* including the draft paper as an appendix.
- 6. After taking two months to reflect, consult with a few noted experts, and engage in additional research, I drafted the Project Atom report, which was then circulated to Project Atom working participants (and several additional experts) for comment and revised several times in February and early March 2015.
 - a. Discussions with Vic Utgoff were particularly useful, in part because he has been considering many of the same questions addressed here.⁷
 - b. In late 2014, Jeffrey A. Larson and Kerry M. Kartchner published a collection of readings entitled *On Limited Nuclear War in the 21st Century* that in some instances mirrored and supplemented the analysis in this paper.⁸
 - c. Former senior Department of Defense (DoD) official and independent consultant John Harvey provided thoughtful and detailed commentary that was much appreciated.
 - d. Appendix F compares the positions taken in this report with the three think team papers on the 5 July 2014 template issues (see Appendix H).⁹
 - e. Thomas Karako joined CSIS as a visiting fellow in the summer of 2014 midway through the Project Atom study effort. He later became a full time senior fellow. In addition to helpful comment on Project Atom products, Dr. Karako took an independent look at how U.S. strategic (not just nuclear) forces could be postured in 2025–2050. His paper is attached at Appendix G.

ADJUSTMENTS TO THE METHODOLOGY

From a process perspective, Project Atom executed the methodology in the manner intended: provide a common framework for the competition of ideas among three independent think tank teams and then develop a CSIS position that would be vetted extensively. One methodological adjustment was referred to in Step 5, namely that the 17 October 2014 CSIS paper was “decidedly NOT an effort to synthesize or integrate the positions” of the NIPP, CNAS, and Stimson Center teams. As demonstrated in the comparison essay at

7. See Andrew J. Coe and Victor A. Utgoff, *Restraining Nuclear War* (Alexandria, VA: Institute for Defense Analysis, June 2011), and Victor A. Utgoff and Michael O. Wheeler, *On Deterring and Defeating Attempts to Exploit a Nuclear Theory of Victory* (Alexandria, VA: Institute for Defense Analysis, April 2013).

8. Jeffrey A. Larsen and Kerry M. Kartchner, eds., *On Limited Nuclear War in the 21st Century* (Stanford, CA: Stanford Security Studies, 2014).

9. Each of the think tank teams had the opportunity to review CSIS’s characterization of their positions in this comparative assessment.

Appendix F, the disagreement on fundamental issues, particularly with respect to the role and value of U.S. nuclear weapons, between the NIPP and CNAS teams, on the one hand, and the Stimson Center team were too great. As the author of the final report, my views were shaped and influenced by the debate among the independent think tank teams, but did not attempt to bridge the differences on fundamentals between the competing approaches.

The second major methodological adjustment concerned how far into the future Project Atom should project—that is, should it postulate a strategy for 2025–2050, as originally intended, or just to 2030 and beyond (aka “2030+”)? In working group discussions on 13 May 2014, several think tank team members argued that there was too much uncertainty about what the security environment might look like in 2040 and beyond, thus making it pointless to speculate about what U.S. nuclear strategy and posture should be. So the time frame for the Likely Future was pulled back to 2030+, which was thought to be far enough into the future that a new nuclear capability could be developed and fielded, but not so far in the future that it was difficult to forecast a Likely Future. However, in reviewing the first drafts of the think tank papers, the CSIS study team concluded that, despite clear differences on the role and value of U.S. nuclear weapons, the recommended 2030+ postures were quite similar across the teams and differed very little from the current U.S. nuclear posture.

One think tank team member commented that the United States has already paid for the current posture, so there is little reason not to keep it. Besides, he continued, from the perspective of U.S. nuclear modernization, “2030+ is not that far away.” The CSIS study team made two adjustments: (1) it reintroduced 2025–2050 as the framework for its analysis in the 17 October 2014 paper; and (2) asked the think tank teams some additional questions (e.g., “What factors would lead you to change your recommended nuclear strategy and posture?”) intended to elicit some “blue-sky” or “blank-check” thinking. As can be seen in Appendices G–J, the additional questions did provoke a bit more “out-of-the-box” thinking. As will be discussed in the next section, reintroducing the 2025–2050 time frame forced Project Atom to abandon the “Likely Future” construct and adopt instead an “assumed future” as the basis for the recommended 2025–2050 U.S. nuclear strategy and posture.

As a final note in this methodological section, I want to endorse the competitive strategies approach as extremely useful for a fundamental, “back-to-basics” review for important public policy issues. The think tank teams produced first-rate papers, and the working group discussions were lively, provocative, and most informative. Adding a few external (to the think tank teams) experts also broadened the discussion and ensured that additional perspectives were brought to bear. Iterating draft Project Atom products, ranging from supporting analysis to the final report, was often a painful process, but the result was a set of ideas that have been well tested in the intellectual marketplace. I want to thank all of the Project Atom participants for engaging in this study effort, as well as the Smith-Richardson Foundation for funding it. And while taking sole responsibility for the views

expressed in this final report, I want to thank everybody for helping me develop and refine them. It was a great learning experience, and I hope the final product meets the high standard set by their level of engagement in this study effort.

Defining the 2025–2050 Security Environment

As defined in the template and framing assumptions paper (see Appendix H), the 2030+ Likely Future is a “projection of current trends and likely developments that takes the current security environment as its departure point and projects how it evolves *in the absence* of ‘wild cards,’ discontinuities, ‘black swans,’ and other game-changing events that would significantly change the nature of the 2030+ security environment.” To ensure that think tank team positions were comparable within a common framework, the CSIS study team relied on an issue template that identified the questions each team had to address and “framing assumptions” (FAs), which were the trends and likely developments that established the boundary conditions for think tank team analysis. These “framing assumptions” were iterated several times with the working group (Appendix H was version #5). With respect to the 2030+ security environment, the working groups accepted the following out of those proposed in Appendix H:

- FA #2: As the world’s strongest (although its margins are decreasing) military power, still with many economic strengths, the United States will continue its post-World War II role as a provider of global stability and principal architect of the international order.
- FA #3: Nuclear weapons in the twenty-first century are one of several weapons that can have strategic effects on a crisis or conflict.
 - Ballistic missile defenses (BMD) will increase the ability to defend against regional small-scale missile attacks but have little utility against nuclear arsenals the size of Russia’s and China’s.
 - Irregular means of delivering a nuclear weapon cannot be entirely eliminated.
 - By 2050, the capacity for destruction and disruption of chemical and biological weapons and offensive cyber weapons will have increased significantly, making it necessary to deter and defend against them (although not necessarily with nuclear weapons).
 - Vulnerability of space-based assets will grow, but nuclear weapons will not have been deployed in space and space-based lasers will remain impractical.
 - Improving conventional prompt global strike (CPGS) capabilities will increase concern among some, if not all, nuclear-armed powers about the risk of nonnuclear attacks on their nuclear weapons, which (when combined with more effective BMD) could negate their assured second-strike capability against the United States.

- FA #7: The 2030+ Likely Future will have 9 to 11 nuclear powers.
 - While the possible addition of Iran, followed closely by Saudi Arabia, to the nuclear club would complicate and raise the stakes in the already complex, uncertain, and violent Middle East, it would not have the global impact that more widespread nuclear proliferation would have. A “proliferated world,” defined in this study as a world of 18 nuclear powers (see Appendix H), would fully realize Paul Bracken’s “second nuclear age” since many more regional conflicts would have a nuclear dimension.

A straight-line projection of today’s security environment, particularly if it is only to 2030+, does not force significant changes to today’s U.S. nuclear posture. If the nuclear triad (plus forward-deployed nuclear bombs in North Atlantic Treaty Organization [NATO] Europe) “works” today, it should work 10–15 years from now. Given the “sunk costs” of prior investment in U.S. nuclear capabilities and the era of austerity triggered by the Budget Control Act of 2011, the overriding bureaucratic and fiscal imperative to extend the life of current systems as long as possible (e.g., a recent RAND study envisions incremental life-extension actions for Minuteman III for decades beyond initial projections).¹⁰ Nuclear warheads wear out (see the B61 bomb), as do delivery systems (see the air-launched cruise missile [ALCM] and *Ohio*-class submarine), and will need to be replaced, but the fiscal environment will suppress the pace of U.S. nuclear modernization. The United States could afford to spend more on its nuclear capabilities—even the largest estimate of a trillion dollars over 30 years still comprises less than 5 percent of the overall defense budget—but is unlikely to unless the security environment changes markedly and significantly increases the perceived role and value of U.S. nuclear weapons in its security strategy.^{11, 12}

There is no neatly empirical way to think about nuclear weapons or about the future. Blast radius, heat, fragmentation, and radiation levels can be calculated. Allied and adversary perception cannot—not tomorrow, and certainly not 30 years in the future. To think about the future need for nuclear weapons requires no small degree of imagination. To make policy choices—which *must be made*—requires judgment based on that imagination.

When it comes to nuclear weapons, there is little that historical precedent or experience can provide. There has never been a nuclear exchange between nations. The only use of atomic weapons, by the United States against Japan on 6 and 9 August 1945, yields little insight about what would happen if nuclear weapons were employed during a war. Even

10. Lauren Castol et al., *The Future of the U.S. Intercontinental Ballistic Missile Force* (Santa Monica, CA: RAND, 2014), http://www.rand.org/content/dam/rand/pubs/monographs/MG1200/MG1210/RAND_MG1210.pdf.

11. Jeffrey Lewis et al., *The Trillion Dollar Nuclear Triad: US Strategic Nuclear Modernization over the Next Thirty Years* (Monterey, CA: James Martin Center for Nonproliferation Studies, January 2014), http://cns.miis.edu/opapers/pdfs/140107_trillion_dollar_nuclear_triad.pdf.

12. All but China (if their reported figures are accepted) spend a higher percentage of their defense budget on nuclear weapons: Pakistan (27 percent), Russia (13 percent), United Kingdom (7 percent), France (7 percent), and China (4 percent). Sources: Bruce G. Blair and Matthew A. Brown, “World Spending on Nuclear Weapons Surpasses \$1 Trillion per Decade,” *Global Zero*, June 2011, http://www.globalzero.org/files/gz_nuclear_weapons_cost_study.pdf; Stockholm International Peace Research Institute (SIPRI), “SIPRI Military Expenditure Database,” http://www.sipri.org/research/armaments/milex/milex_database.

the conclusion that nuclear weapons ended World War II by breaking the Japanese will to fight is still being debated.¹³ This is also the case with the nonuse of nuclear weapons (the so-called nuclear taboo) and the theory and practice of deterrence during the Cold War. Did it work or were the Cold War opponents lucky?

My views on the nature of the 2025–2050 security environment are considerably more pessimistic than those expressed in the 2030+ Likely Future.¹⁴ The recommendations made here are based on two related propositions about what would occur *in the absence* of an effective U.S. nuclear strategy to counteract these trends. Of course, these propositions are judgments, not absolute truths, and are debatable. They also risk being self-fulfilling prophecies, because strategies and weapons designed to cope with a more threatening security environment often make it more likely that the darker future will, indeed, occur. However, that risk is outweighed by the risk of planning for a more benign future and being unprepared for the grimmer one that the United States might actually face. While acknowledging up front that two propositions below are debatable, they are made explicitly in order to facilitate a debate on the fundamentals, which is consistent with the competitive strategies approach of Project Atom.

Proposition #1: The dynamics of the 2025–2050 security environment will cause further nuclear proliferation—perhaps not to the 18 nuclear powers envisioned in an alternative future, but higher than the 9-to-11 nuclear powers of the 2030+ Likely Future.

Proliferation optimists note that warnings over the coming cascade of proliferation have been made for decades, most notably by President John F. Kennedy, but have not materialized. However, the current trend line is quite negative:

- The United States invaded Iraq in 2003 in large part because the Bush administration wanted to prevent Saddam Hussein from getting nuclear weapons; Hussein was rapidly removed from power and subsequently hanged in a Baghdad basement.
- Perhaps startled by the ease with which the United States removed Hussein from power, Muammar el-Qaddafi gave up his nuclear weapons program and ended up dying even more ignominiously than his Iraqi counterpart.
- Despite receiving several “red-line” warnings and becoming more isolated, both diplomatically and economically, North Korea joined the nuclear club even as the Kim dynasty endured a generational change of power; in this instance, acquiring a nuclear weapon has helped ensure regime survival.

13. Ward Wilson, “Military Wisdom and Nuclear Matters,” *Joint Force Quarterly* 68, no. 1 (2013): 18–24.

14. Paul Bernstein divides the expert community into “proliferation optimists,” who note that previous predictions of a “highly proliferated world” have not come true and there’s no reason why they should now, and “proliferation pessimists,” who take “little comfort” in the historical record and believe that the global nonproliferation regime is “weakening.” (See Paul I. Bernstein, “The Emerging Nuclear Landscape,” in *On Limited Nuclear War in the 21st Century*, ed. Jeffrey A. Larsen and Kerry M. Kartchner [Stanford, CA: Stanford Security Studies, 2014], 102–3.) I am squarely in the latter camp.

- The jury is out on whether Iran will give up its nuclear weapons program, but many believe that Saudi Arabia would rapidly “go nuclear” if Iran joined the Democratic People’s Republic of Korea (DPRK) as the newest members of the nuclear club;
- With three Middle Eastern powers in the nuclear fold, the incentives would grow for Egypt and Turkey to follow suit.
- If such a regional proliferation cascade occurred, the perceived power of the United States would be diminished, which would have repercussions elsewhere as regional allies increasingly doubt the will and ability of the United States to counter a more belligerent Russia and an increasingly assertive China.

A major stimulus for a faster rate of nuclear proliferation is U.S. conventional military superiority. This causes nonnuclear nation-states (such as North Korea, Iran, Iraq, Syria, and Libya) to pursue nuclear weapons as a counter or offset to U.S. military prowess. It also leads nuclear-armed states with interests in opposition to the United States (Russia, for sure, and perhaps China) to increase their reliance on nuclear weapons, much in the way that the United States did during the Cold War.¹⁵ Although the margin of U.S. conventional superiority has never been as great as often proclaimed (e.g., see the lower end of the spectrum of conflict) and is declining relative to other major powers, the prospect of a conventional-only war with the United States is a losing proposition for any state. The value of nuclear weapons as a “trump card” for negating U.S. conventional power was enhanced by the U.S. invasion of Iraq in 2003 to prevent Saddam Hussein from acquiring a nuclear weapon. If the United States apparently believes that it can be deterred by an adversary’s nuclear weapons, why would a nonnuclear “regional rogue” not want one? This leads directly to my second (more pessimistic) proposition about the 2025–2050 security environment:

Proposition #2: The credibility of U.S. extended nuclear deterrence, as well as the assurance that U.S. allies and friends derive from it, will decline significantly in 2025–2050, in part because of the failure to prevent further nuclear proliferation.

More nuclear-armed regional adversaries (to the United States and its allies) and increased reliance on nuclear weapons by major powers in competition with the United States will lead U.S. nonnuclear allies to rely more on U.S. security commitments, especially with regard to extended nuclear deterrence. However, the credibility of those commitments will have been weakened by the failure of U.S.-led efforts to prevent the nuclear proliferation that led to the increased demand from its allies for help in deterring nuclear-armed adversaries. While some (including myself) argue that it is not realistic to believe that a nation both capable of acquiring a nuclear weapon and determined to do so can be stopped, the inability of the United States to prevent what it has repeatedly declared is

15. And at a much cheaper price: Paul Bracken noted that “Nuclear weapons allowed the United States to get away with defense on the cheap,” because the United States (and its peak-sized army of 20 divisions) offset the Soviet Union (and its 200-plus divisions) with defense budget levels of order smaller (in terms of percentage of gross domestic product (GDP)) than the Soviet Union, which typically spent 25 percent of its GDP on the military. Bracken, *Second Nuclear Age*, 45.

“unacceptable” will erode its credibility to cope with the “unacceptable” when it nevertheless happens.

U.S. threats to employ the full range of its military capabilities (including nuclear weapons) to respond to nuclear attacks against their allies are at the core of both extended deterrence and assurance. How credible those “statements of intent” are to potential adversaries (in the case of extended deterrence) and to its allies (in the case of assurance) depend on adversarial and allied perceptions of U.S. nuclear capabilities and will:

- As reflected in the now-infamous Healey theorem, which states that credible assurance requires a 95 percent probability that a nuclear threat will be carried out versus a 5 percent probability for credible deterrence, the standards for credibility will depend on context and the specific actors.¹⁶
- How credible will U.S. security commitments be in 2025–2050, both to its adversaries and its allies? After North Korea’s nuclear test in February 2013 and statements by the United States that it would not consider redeploying tactical nuclear weapons (TNWs) on the peninsula, 66 percent (10 percentage points higher than in 2010) of the South Korean public supported a domestic nuclear weapons program.¹⁷
- Assurance in 2025–2050 will depend less on what the United States says to its allies about its commitment to them and more on the allies’ perception of how well the United States actually acts when its security commitments are challenged. Today, the United States and its allies are “talking the talk,” but that is less likely to be enough in the future.
- As demonstrated recently with respect to U.S. enforcement of red lines against the use of chemical weapons in Syria, credibility can be lost, and once lost, may be hard to reestablish. Nuclear-armed regional powers, many with irredentist agendas, will engage in more provocative behavior (see North Korea in 2010) and erode the faith of U.S. allies in U.S.-extended deterrence commitments.
 - In a 2006 study (in which I participated) on realigning the U.S. global military posture, a senior South Korean defense official, when asked about the U.S. willingness to risk San Francisco for Seoul, said, “I think I believe it, but I’m not sure the Chinese do.”

A faster rate of nuclear proliferation both adds to the demand for the U.S. nuclear umbrella and erodes its credibility. This vicious circle is likely to continue *unless* the United States moves forcefully to counter it, which, in my judgment, requires a U.S. nuclear strategy designed for twenty-first century realities. Adoption of the recommended strategy could limit nuclear proliferation to the greater Middle East and prevent it from spreading to Northeast Asia, Europe, and elsewhere.

16. Denis Healey, *The Time of My Life* (New York: W.W. Norton, 1990), 6.

17. Jiyeon Kim, Karl Friedhof, and Chungku Kang, “The Fallout: South Korean Public Opinion Following North Korea’s Third Nuclear Test,” *Issue Brief: The Asian Institute for Policy Studies* 46 (2013), 7–9.

2025–2050: The Role or Function of U.S. Nuclear Weapons

The principal role of U.S. nuclear weapons is to deter other states from employing nuclear weapons against the United States and its allies.^{18, 19} U.S. nuclear weapons ensure that any major conflict with the United States has a nuclear dimension and occurs under a “nuclear shadow.”²⁰ Deterring nuclear attacks is not the sole purpose of U.S. nuclear weapons, in part because it is U.S. policy to maintain “strategic ambiguity” about the circumstances under which the United States might actually employ nuclear weapons. In perhaps the last semi-explicit nuclear threat made by the United States, Secretary of State Jim Baker told Tariq Aziz, Iraq’s foreign minister, that “If you use chemical or biological weapons against U.S. forces, the American people will demand vengeance. And we have the means to exact it . . . This is not a threat, it is a promise.”²¹ Although the effect of this implied threat of nuclear retaliation on Iraq’s behavior is still the subject of much debate, the possession of nuclear weapons by the United States (and any other nuclear-armed state, for that matter) has an inherent or intrinsic deterrent effect, because it, unlike nonnuclear states, can escalate to the nuclear level.²²

- Debates over declaratory policies such as no-first-use have always been a little unreal. The circumstances under which a state—that is, the men and women acting on behalf of that nation—would actually employ a nuclear weapon are characterized by extreme urgency, great peril, and fundamental uncertainty. Statements made during peacetime about what a nation’s leadership would actually do under those

18. Nonstate actors who gain possession of a nuclear weapon are nondeterrable—criminal elements will sell the weapon to the highest bidder and terrorist groups (in this era of suicide bombers) will employ it. One kills, contains, disrupts, and destroys nuclear-armed nonstate groups. Nuclear deterrence is not relevant to this security challenge, although one might consider employing a nuclear weapon against a nonstate actor in order to send a message to a state providing sanctuary for that nonstate actor. Nuclear weapons are used to influence the behavior of nation-states through the threat of retaliation and are employed against targets valued by the men and women who decide and act on behalf of that state.

19. The statement that “we use nuclear weapons every day” is frequently made and is fundamentally true. The possession of a nuclear weapon by State A affects other states’ perceptions about the capabilities and will of State A and, thus, provides State A with a basis (but by no means the only one) for influence relationships (including deterrence) with other states. In contrast, the *employment* of a nuclear weapon is a physical act that involves “blast, heat, and fragmentation” and has a radioactive signature.

20. While tautological and subject to varying interpretations, “minor” conflicts (like “minor aggression” or “smaller-scale contingencies”) do not involve a nuclear dimension, because, by definition, they are not seen as important enough to warrant consideration of nuclear employment. Similarly, U.S. interests are considered “vital” if they are deemed important enough to warrant employing military force (including nuclear weapons) in defending them.

21. James A. Baker III, “Opening Statement,” Senate Foreign Relations Committee, May 19, 2010, [http://www.foreign.senate.gov/imo/media/doc/Baker Testimony100519p.pdf](http://www.foreign.senate.gov/imo/media/doc/Baker%20Testimony100519p.pdf).

22. As I observed in my 2008 report on DoD and the nuclear mission, the subsequent memoirs of the principal U.S. decisionmakers at the time disavowed any serious consideration of the nuclear option, which “makes it hard to make credible threats when you tell the world (including future adversaries) that you were bluffing the last time you made one.” See Clark A. Murdock, *The Department of Defense and the Nuclear Mission in the 21st Century: A Beyond Goldwater-Nichols Phase 4 Report* (Washington, DC: CSIS, March 2008), 18, <http://csis.org/files/media/csis/pubs/080305-murdock-nuclearmission.pdf>.

circumstances have always been speculative, if only, as Yogi Berra is alleged to have said, “making predictions is awfully hard, particularly about the future.”

Nuclear weapons are a critical element of the global distribution of power that provides the underlying structure for relationships (including deterrence) among all states, not just those states seeking to oppose the United States. The world is divided into nuclear-armed and nonnuclear states, the latter of which includes “threshold nuclear powers” or “latent nuclear powers” (i.e., states that could “go nuclear” fairly quickly) and “nuclear wannabes” (a group that used to include North Korea). How U.S. nuclear capabilities stack up against those of other nuclear-armed states matters. Since World War II, the U.S. superpower status has included maintaining nuclear capabilities that are “second-to-none,” which, as will be discussed, the United States should sustain in 2025–2050.

2025–2050: Recommended U.S. Nuclear Strategy

DISCRIMINATE NUCLEAR OPTIONS

The scenarios for nuclear employment have changed greatly since the “balance of terror” between the two global superpowers. During “the first nuclear age,” it was the mutual fear of nuclear escalation that kept the Cold War cold as the United States and the Soviet Union engaged in Thomas Schelling’s “competition in risk taking.”²³ In “the second nuclear age,” our adversaries have to cope with a United States that both possesses conventional superiority and acts as if nuclear war were unthinkable. Of course, they are thinking through how they might actually employ a nuclear weapon to get the United States to “back off” in a crisis or conflict. Russian military officers have said they are developing “very low-yield” weapons (most likely in the subkiloton range) that will be very accurate and “clean” (i.e., producing little radiation), thus minimizing collateral damage.²⁴ If such a weapon were employed against U.S. or allied forces, the United States might not “respond in kind,” because its nuclear response options were larger, “dirtier,” and caused significant collateral damage. To counter this risk of “self-deterrence,” the United States needs more discriminate nuclear options across the range of nuclear attacks.

The United States is not well postured for this type of nuclear employment scenario. Its Cold War-era nuclear weapons were designed for a global conflict involving thousands of high-yield weapons in a massive exchange. The United States needs to develop and deploy more employable nuclear weapons, ones that enable the United States to respond directly and proportionately to an adversary’s employment of a nuclear weapon. This is not about “nuclear war-fighting,” but demonstrating the resolve to match an adversary’s escalation of a conflict to the nuclear level. By doing so, the United States sends a powerful political message—“You can’t win this conflict by going nuclear”—and, in effect, makes nuclear escalation a less attractive option.

23. Thomas C. Schelling, *Arms and Influence* (New Haven, CT: Yale University Press, 1966), 91.

24. Mark B. Schneider, “Russian Nuclear Modernization,” National Institute for Public Policy, June 20, 2012, <http://www.nipp.org/wp-content/uploads/2014/11/Schneider-Russian-nuclear-modernization-.pdf>.

Credibility, it is often noted, is always in the eyes of the beholder. To a potential adversary considering employing a nuclear weapon to offset the conventional superiority of the United States, the awareness that the United States has anticipated this eventuality and developed more discriminate, more employable nuclear options of its own will be doubly impactful, because it demonstrates the same kind of hard-nosed, realistic thinking that led him to consider employing a nuclear weapon in the first place.

The Stimson Center paper notes that their recommended nuclear posture is “dependent on U.S. conventional military superiority” and “so does not need to rely on weak state tactics.”²⁵ This misses the basic point—the United States needs to focus on its nuclear deterrent because its potential adversaries will rely more on nuclear capabilities to compensate for their conventional weakness. U.S. conventional superiority gives it escalation control at the conventional level and causes its adversaries to think about breaking the nuclear threshold. The United States needs employable nuclear options at all rungs of the nuclear escalation ladder to make that option unattractive as well.

FORWARD-DEPLOYED U.S. NUCLEAR WEAPONS

With the exception of about 200 B61 nuclear bombs deployed in five NATO Europe countries, the United States no longer forward deploys nonstrategic nuclear forces (NSNF). U.S. naval surface ships no longer carry nuclear weapons and the nuclear variant of the U.S. Navy’s cruise missile (TLAM-N), which was once characterized as the Navy’s “theater nuclear weapon” to be used in defense of its Northeast Asian allies, has been withdrawn from service. The United States still forward deploys American military personnel (albeit in much lower numbers) but has largely dismantled the “inner ring” of nuclear weapons that once encircled its principal adversaries.

U.S.-extended deterrence commitments will be significantly less credible (both to potential adversaries and our allies) in 2025–2050 than they are today *unless* that commitment is provided by U.S. nuclear weapons based on the territory of the ally whose security is threatened by a nuclear-armed regional adversary. Extended deterrent threats are inherently less believable than direct deterrence threats, since they involve putting the U.S. homeland at risk by attacking the adversary’s homeland in response to a nuclear attack on the homeland of the U.S. ally. This dilemma is often expressed in the question “Will the United States trade Los Angeles (or New York City) for Tokyo (or Berlin)?”²⁶

“Coupling” U.S. security to the security of its allies was always a huge challenge during the Cold War. Although U.S. nuclear strategy and employment policy changed from “massive retaliation” to flexible response, it was the presence of 7,000 U.S. nuclear weapons in

25. See Appendix C.

26. In commenting on an earlier draft of this report, a former senior government official wrote: “If we are not willing to risk our homeland in defense of allies, then we better get out of this business. Your expressing this view is not helpful to long term assurance goals.” The issue is not whether we believe it; it’s whether our adversaries believe it. And just as it did during the Cold War, the act of putting U.S. nuclear weapons on the territory of its allies will have more credibility than any words American leaders utter about how the United States will respond if its allies are attacked by a nuclear weapon.

How Russia is thinking about its nuclear weapons: at the level of doctrine

In his masterful survey of the emerging nuclear landscape, Paul I. Bernstein concludes:

“[It] is clear that Russia’s nuclear strategy today encompasses a concept for deterring and terminating conventional war based on the threat of limited nuclear strikes for the purposes of “demonstration” and “de-escalation.” In this context, these terms refer to a “limited counter-force nuclear strike in the theater of military operations”—an action compensating for conventional force weakness intended to compel the adversary’s withdrawal by signaling Russia’s high stake in the conflict and its willingness to escalate the level of violence in order to prevail. This approach, premised as it is on the strategy of nuclear first use against a conventionally superior adversary to alter the political dynamics of conflict, is strikingly similar to the concept of flexible response that defined NATO’s strategy for many years.”

—Paul I. Bernstein, “The Emerging Nuclear Landscape,” in *On Limited Nuclear War in the 21st Century*, ed. Jeffrey A. Larsen and Kerry M. Kartchner (Stanford, CA: Stanford Security Studies, 2014), 109.

Europe that ensured that any major conflict in the Europe region would escalate rapidly to nuclear war. And the United States deployed hundreds of nuclear weapons in South Korea (and about 3,000 nonstrategic nuclear weapons in the Pacific Region) to underscore its extended deterrence there.²⁷ This encirclement by forward-based U.S. nuclear weapons worked during the Cold War and was largely dismantled after the Cold War ended.

In 2025–2050, the goals of U.S. nuclear strategy will remain the same, but the manner in which they are pursued will likely change. The 2014 Quadrennial Defense Report (QDR) states that

Our nuclear deterrent is the ultimate protection against a nuclear attack on the United States, and through extended nuclear deterrence, it also serves to reassure our distant allies of their security against regional aggression. It also supports our ability to project power by communicating to potential nuclear-armed adversaries that they cannot escalate their way out of failed conventional aggression.²⁸

When security anxieties are acute, “reassurance” or “assurance” is most reliably provided by credible extended deterrence—if American allies’ adversaries are deterred, they will be assured. Deterring regional adversaries from “going nuclear” requires credible nuclear responses to their nuclear attack options. Forward deploying a robust set of

27. Arms Control and Non-Proliferation Initiative, “50 Facts About U.S. Nuclear Weapons Today,” Brookings, April 28, 2014, <http://www.brookings.edu/research/articles/2014/04/28-50-nuclear-facts>.

28. DoD, *2014 Quadrennial Defense Review Report* (Washington, DC: DoD, 2014), v.

How Russia is thinking about its nuclear weapons: in messaging NATO

In a recent policy brief on “close military encounters”—defined as violations of national airspace, emergency scrambles, narrowly avoided mid-air collisions, close encounters at sea, and other dangerous actions—between Russia and the West, a European Leadership Network (ELN) brief noted that NATO had already conducted over 100 intercepts of Russian aircraft by late October 2014, three times more than in 2013. The brief identified and categorized three types of incidents: 2 High Risk (a high probability of casualties or direct military confrontation) ones; 11 Serious Incidents with Escalation Risk; and 15n Near Routine Incidents, whose growing frequency added to “an atmosphere of tension.” The ELN policy brief also noted that “Russia has also been conducting a series of major exercises involving various units from the Western and Southern Military Districts. The geographical extent of these exercises ranges from the Black Sea littoral through the Russian border with Ukraine, and involves units from not only the Army, Navy, and Air Forces, but also from Russia’s Strategic Nuclear Forces. These activities . . . have been rightly perceived as threatening actions by Russia’s neighbors.”

—Thomas Frear, Lukasz Kulesa, and Ian Kearns, “Dangerous Brinkmanship: Close Military Encounters Between Russia and the West in 2014,” (London: European Leadership Network, November 2014), 9.

discriminate nuclear response options conveys the message that the United States will “respond in kind” and proportionately to nuclear attacks upon its allies. The credibility of that message is reinforced because the U.S. homeland would not be engaged in the U.S. response to a nuclear attack on a regional ally, which leaves the burden on the regional aggressor to escalate to the level of “homeland exchanges.”²⁹ The price, however, for this more credible U.S. “nuclear umbrella,” is the ally’s willingness to host U.S. nuclear weapons.³⁰ This is what constitutes “nuclear burden sharing” in 2025–2050.

29. One SME I consulted believes that it would not matter to China, for example, if the United States responded to its employment of a nuclear weapon against Japan with a U.S. nuclear weapon deployed in the region rather than one based in the continental United States (CONUS) or on a submarine. I disagree. I think it mattered to the Soviet leadership during the Cold War and it would matter to the Russian or Chinese leadership in 2025–2050. A retaliatory strike from a forward-deployed system, particularly if it is based on the territory of the ally that was attacked, is a more proportional response to the initial attack and, hence, more likely than one from a CONUS-based system. It is also still a step (or more) short of a homeland-to-homeland exchange and its risk of escalation to general nuclear war. As another SME commented, the Russians are “mov[ing] toward a doctrine of early, discrete nuclear weapons use,” but many American planners (in the view of another SME) believe that the war would escalate quickly once the nuclear threshold is breached. As I observed earlier in this report, there is no evidentiary basis for thinking about nuclear war. As with many nuclear issues, it is theological in nature. One either believes that escalation can be controlled at the nuclear level or not. I do. The globally shared awareness of the cataclysmic effect of “unrestrained” (to use Vic Utgoff’s terminology) nuclear war has certainly (in my view) contributed to the nonemployment of nuclear weapons since 1945. It is likely (again, in my view) to keep any nuclear exchange “restrained” if such an awful tragedy should occur.

30. Vic Utgoff believes that hosting U.S. forward-based nuclear weapons represents a political burden that most, if not all, potential host nations will be reluctant to bear. As an alternative, he argues that if extensive preparations are made for forward deployment, U.S. nuclear weapons could be brought forward in a crisis. (See

How Russia is thinking about its nuclear weapon: heavy handed diplomacy

"I want to remind you that Russia is one of the most powerful nuclear nations. This is a reality, not just words . . . [other countries] should understand it's best not to mess with us."—Vladimir Putin, August 29, 2014

"We hope that our partners will realize the recklessness of attempts to black-mail Russia, will remember the risks that a spat between major nuclear powers incurs for strategic stability."—Vladimir Putin, October 15, 2014

"You can do a lot more with weapons and politeness than just politeness."—Vladimir Putin, November 19, 2014

"Sometimes I think, maybe it would be better for our bear to sit quiet, rather than chasing around the forest for piglets. To sit eating berries and honey instead. Maybe they will leave it in peace. They will not. Because they will always try to put him on a chain, and as soon as they succeed in doing so they tear out his fangs and claws. [By "fangs and claws," Putin said he meant Russia's nuclear weapons.] Once they've taken out his claws and fangs, then the bear is no longer necessary. He'll become a stuffed animal. The issue is not Crimea, the issue is that we are protecting our sovereignty and our right to exist."—Vladimir Putin, December 18, 2014

Some U.S. allies will be tempted to get their nuclear deterrence "on the cheap." Preferring to remain a nonnuclear state and unwilling to host U.S. nuclear weapons, they will do the "assurance dance" and press the United States to bolster the credibility of its extended deterrent by adopting a "stronger" declaratory policy, engaging in more intensive alliance consultations, and the like. This may "work" today but is increasingly less likely to in the more perilous security environment of 2025–2050. "On the cheap" extended deterrence in the twenty-first century will be less credible, if only because it requires that the United States accept a disproportionate share of the risks associated with nuclear deterrence.

In regions containing a nuclear-armed aggressor, the choices facing nonnuclear states are likely to be increasingly stark: acquire one's own nuclear weapons, host nuclear weapons from a nonregional actor (and pay the price of alignment), or accommodate the regional aggressor (by appeasement, realignment, etc.). The post-Cold War era seems to be coming to an end; the realities of the "post-post-Cold War era" will be harsher and the tradeoffs will be clearer to all, including allied and American publics.³¹

Chang Kwoun Park and Victor A. Utgoff, "On Strengthening Extended Deterrence for the ROK-US Alliance," *Joint Force Quarterly* 61, no. 1 (2013): 18–24.) However, I believe that moving a U.S. nuclear weapon forward during a crisis would be seen as too provocative by both the United States and the host nation. A "nuclear umbrella" that works when it really matters needs to be in place before the crisis occurs.

31. The author first heard this characterization in an off-the-record conference in late January 2015.

The nuclear strategy being recommended here is called “Measured Response.” This is not a new strategy—it is grounded in the U.S. strategy of escalation control that evolved as the United States adopted its flexible response strategy in the 1960s. As Kerry M. Kartchner and Michael S. Gerson observe:

The underlying logic of escalation control originated in the Kennedy administration, when Secretary of Defense Robert McNamara shifted U.S. nuclear war plans away from a single, all-out nuclear attack against the full range of military, economic, and civilian targets in Warsaw Pact countries, to a strategy that emphasized initial strikes only on Soviet nuclear forces. The central idea was that, rather than using its forces all at once, the United States would first execute a more limited strike and use its remaining weapons to deter Soviet escalation by threatening additional attacks. . . . The combination of smaller, controlled nuclear strikes and a large, survivable reserve force that would be used to threaten further attacks was at the heart of strategies for escalation control. Subsequent revisions to U.S. nuclear war plans, especially in the Nixon and Carter administrations, were intended to provide increasingly limited and flexible nuclear options to enhance the credibility of deterrence and, if deterrence failed, to control escalation and terminate the war at the lowest possible level of violence.³²

Russia’s growing reliance on nuclear weapons has led it to plan for and exercise the early employment of a nuclear weapon in a conflict with a superior conventional foe. China is modernizing and expanding its nuclear forces, in part to ensure their survivability against the combination of U.S. advanced conventional weapons and improving ballistic missiles defenses. Despite the veil of opaqueness on any Chinese thinking about how it might employ its nuclear weapons against the United States, I have little doubt that they are. The United States needs to think about how to counter that.

However, this is not a strategy of “escalation dominance,” which was defined by Kartchner and Gerson as the ability “to fight harder, longer, and more effectively than the Soviets at all levels of conflict short of general nuclear war,” a capability that, in effect, required nuclear superiority.³³ Deterring an adversary from breaking the nuclear threshold is not the same as preparing for limited nuclear war. It’s about ensuring that there are no gaps in U.S. nuclear response options that would prevent it from retaliating proportionately to any employment of a nuclear weapon against the United States and its allies. If unable to respond proportionately, the United States could be “self-deterred,” because responding in kind (i.e., with a nuclear weapon) might be seen (by American decisionmakers) as going “too far” up the escalatory ladder.

U.S. conventional superiority lowers the nuclear threshold, because it tempts conventionally weaker adversaries to early (rather than as a last resort) employment in order to

32. Kerry M. Kartchner and Michael S. Gerson, “Escalation to Limited Nuclear War in the 21st Century,” in *On Limited Nuclear War in the 21st Century*, ed. Jeffrey A. Larsen and Kerry M. Kartchner (Stanford, CA: Stanford Security Studies, 2014), 156.

33. *Ibid.*, 157.

avoid adverse results at the conventional level. By having a robust set of proportionate nuclear responses, the United States raises the nuclear threshold because it reduces the attractiveness of nuclear escalation. This may seem paradoxical, to be sure, but paradoxes seem to be endemic to any nuclear era.

While the United States should continue to maintain “strategic ambiguity” about the universe of circumstances that could lead it to employ a nuclear weapon, it should be absolutely clear that it will respond in kind to any nuclear attack. Failing to do so, even when there might be a nonnuclear response capable of achieving the same military effects (minus the radiation) weakens the U.S. nuclear deterrent, both with the perpetrator of the attack and any other state trying to assess U.S. willingness to cross the nuclear threshold. There should be no ambiguity about this contingency—“nuke us and we’ll nuke you.” It is Deterrence 101.³⁴

2025–2050: Recommended U.S. Nuclear Posture

Before identifying the nuclear weapons—that is, the nuclear warheads and delivery systems—that the United States will need to execute this strategy, this list of ancillary assumptions about supporting capabilities and boundary conditions needs to be enumerated, because they (in addition to the right nuclear capabilities) are also necessary if the proposed strategy is to succeed:

- *Responsive infrastructure.* A healthy nuclear complex capable of supporting the recommended posture.
- *Robust Nuclear Command and Control (NC2) System.* Conducting a limited, tightly controlled nuclear exchange would stress the NC2 system, which would have to be fully effective and resilient.
 - Advanced conventional weapons, cyber- and electronic-warfare capabilities could significantly degrade the U.S. ability to conduct controlled nuclear operations, but the assumption here is that DoD will make the investments needed to cope with them.
- *Affordable Nuclear Modernization Program.* DoD and Department of Energy (DoE) spending on nuclear weapons remains roughly at current levels—that is, \$30–35 billion per year (in 2015 dollars), about 4–5 percent of the overall defense budget.
- *Improved, but not fail-proof, defenses against small-scale nuclear attacks.* Effective defenses—against ballistic and cruise missiles, anti-aircraft and unconventional delivery means (e.g., smuggled into CONUS in a ship container)—would raise the barrier for conducting a nuclear attack against the United States, but would not

34. An external SME observed that a collapsing adversary (such as North Korea) could employ a nuclear weapon as a last-gasp, in-your-face act of anger and revenge, in which case the United States might not want to respond in kind. Perhaps. But this contingency is not one that should be explicitly accounted for as part of U.S. declaratory policy for how it will employ nuclear weapons.

cancel the threat. The United States remains vulnerable to large-scale nuclear attacks.

- *A revitalized nuclear mission in DoD.* In adopting the recommended strategy of Escalation Control, the DoD successfully addresses the drift and malaise that characterized the nuclear enterprise in 2007–2014. There is no point in developing and acquiring more employable nuclear weapons unless the DoD has trained and exercised with them and is seen as willing and able to employ them.
- As recommended in the author's March 2008 report on *DoD and the Nuclear Mission*, this could involve creating a U.S. Nuclear Operations Command modeled after the U.S. Special Operations Command.³⁵

These assumptions are not self-fulfilling and are not trivial. But if the U.S. government fails to make these assumptions come true, the recommended 2025–2050 nuclear strategy and posture will lose much of its effectiveness and credibility.

SHAPING THE FORCE

The “second-to-none” yardstick for measuring rough parity with Russian nuclear forces does okay at the strategic level: despite Russia’s robust nuclear modernization program, most (but hardly all) U.S. analysts believe that U.S. strategic nuclear forces meet the “second-to-none” standard for maintaining rough parity with Russia.³⁶ Russia’s nuclear forces will be considerably younger than that of the United States and will include systems (e.g., road- and rail-mobile intercontinental ballistic missiles [ICBMs]) not in the U.S. arsenal. But the U.S. nuclear triad of submarine-launched ballistic missiles (SLBMs), ICBMs, and bombers is sufficiently strong and flexible that few analysts believe that the United States has inferior strategic nuclear forces. Plus, the U.S. nuclear triad is being modernized, albeit at a significantly slower pace than Russia’s.

That is not the case with nonstrategic nuclear weapons (aka “tactical nuclear weapons”)—the United States has one system, the B61 bomb, in its inventory, while Russia retains the full range of its battlefield nuclear weapons and is modernizing them (e.g., the new Russian *Iskander-M* is said to be nuclear capable and has been used in exercises involving strategic nuclear forces).^{37, 38} The issue is not whether the Russians are superior in this dimension of nuclear weapons; the issue is whether that superiority matters. While I do not believe that the United States needs to match Russia quantitatively, I do believe that

35. Murdock, *Department of Defense and the Nuclear Mission in the 21st Century*.

36. See Mark B. Schneider, “The State of Russia’s Strategic Forces,” *Defense Dossier 12* (October 2014), http://www.afpc.org/files/defense_dossier_october_2014.pdf.

37. Schneider reports that the former Duma Defense Committee vice chairman Alexi Arbatov claims that Russia’s inventory of TNWs “includes short-range nuclear missiles, nuclear artillery, nuclear landmines, nuclear air and missile defense weapons, nuclear anti-ship missiles and bombs, nuclear depth charges, nuclear antisubmarine warfare missiles, nuclear torpedoes, nuclear bombs, coastal missile complexes and the missiles of the Russian Air Force’s and Navy’s non-strategic aviation.” See Schneider, “The State of Russia’s Strategic Forces,” 15–16.

38. *Ibid.*, 16.

Table 1. Warhead yields

Designation	Warhead	Yield (Kilotons)
NUCLEAR		
B-29 Superfortress	Little Boy	15
B-29 Superfortress	Fat Man	21
Current Inventory		
ICBM-LGM-30G Minuteman III	Mk-12A	335
ICBM-LGM-30G Minuteman III	Mk-21/SERV	300
SLBM-UGM-1323A Trident II D5	Mk-4: 4 W76 MIRV	100
SLBM-UGM-1323A Trident II D5	Mk-4A: 4 W76-1 MIRV	100
SLBM-UGM-1323A Trident II D5	Mk-5: 4 W88 MIRV	455
B-52H Stratofortress	ALCM: W80-1	5-150
B-2A Spirit	B61-7/B61-11, B83-1	10-360/400, low-1,200
Nonstrategic-F-16 DCA, F-15E, Tornado	B61-3/B61-4	0.3-170/0.3-50
UNDER DEVELOPMENT (Nuclear)		
F-15E, F-16 DCA, Tornado, F-35A	B61-12	0.3-50
CONVENTIONAL		
Massive Ordnance Penetrator (MOP)—carried aboard B-2A and B-52H	GBU-57A/B	0.003

Russia's qualitative superiority in nonstrategic nuclear weapons does undercut the proposed Measured Response strategy.

As illustrated in Table 1, there are several potentially significant “gaps” in U.S. nuclear response options. ICBM warheads are three times as powerful as those carried by Ohio-class submarines, but, at 100 kts, the W-76 is hardly a discriminatory weapon and is 20 times more powerful than the 5 kt version of the ALCM-delivered W-80 warhead, which is the lowest-yield weapon in the strategic stockpile. As a point of comparison, the 15 kt weapon that incinerated Hiroshima was about twice (2.08) as powerful as the 5 kt variant of the W-80 warhead on an ALCM. These weapons were designed for the Cold War threat posed by the Soviet Union, which had an inventory that included weapons even larger than the American ones. These weapons are not very relevant to the nuclear employment scenarios that are likely in 2025–2050.

At the nonstrategic level, the United States does have subkiloton options in the “dial-a-yield” B61-3/4 bomb deployed on dual-capable F-16s. While the smallest variant of the B61 bomb is “only” 0.3 kt, that is still 20 times (21.5) more powerful than the largest-yield conventional weapon (the 30,000-pound Massive Ordnance Penetrator [MOP]). The B61-3/4 is slated to be replaced by the B61-12, which is also a variable-yield weapon with options that are not yet known (or perhaps to be determined). If current nuclear modernization plans hold firm, they will be delivered initially by the B-2A and then by the new long-range bomber (LRS-B) and dual-capable F-35As. The “life-extension” program for the B61 bomb

will likely result in a weapon that has at least 2-kiloton-or-smaller variations, but aside from greater accuracy, no additional “special effects” such as enhanced-radiation, earth-penetration, or low-radiation, all of which appear to be in active development in Russia (and elsewhere). Moreover, unlike their counterparts elsewhere, the U.S. military (with the likely exception of a few cells of planners sprinkled throughout DoD) are not seriously engaged in thinking through (by war-gaming, simulations, etc.) how nuclear weapons might be employed, much less training and exercising U.S. forces in their employment.³⁹ The United States is simply not preparing to counter how its potential adversaries are (or may be) preparing to counter its conventional superiority.

The nuclear posture needed for the recommended strategy of Measured Response is quite similar to that recommended by the CNAS think tank team:

The ideal U.S. nuclear force is one that is not only highly survivable and able to issue a devastating blow against any adversary under any scenario but that is also capable of conducting limited nuclear operations in a controlled fashion while maintaining the ability to escalate to full-scale war if necessary. It is a force that can achieve reasonably precise effects . . . under a wide spectrum of possible scenarios, enabling a more effective limited nuclear war capability and thus providing greater leverage and advantage for the United States.⁴⁰

A robust set of discriminate nuclear warheads deliverable by ballistic missiles, cruise missiles, and aircraft would ensure that the United States could respond in kind and proportionately to any nuclear attack against the United States and its allies. Special-effects weapons include low collateral, enhanced radiation, earth penetration, electromagnetic pulse, and others to be determined (as technology advances and the renewed nuclear enterprise matures). While the CNAS injunction to pursue the “greatest feasible variety of weapons effects” is probably too ambitious, as well as unaffordable, the aggressiveness of the research and development (R&D) program for nuclear weapons is a key indicator of how seriously the United States is pursuing this recommended strategy.⁴¹

Preparing for twenty-first-century nuclear employment scenarios requires more than extending the life of a nuclear posture designed for the Cold War era. After thinking through how nuclear weapons might be employed against the United States and its allies, the DoD must develop the concepts of operation (CONOPs) for countering them and then acquire the requisite capabilities. U.S. forces need to be trained (and exercised) in how to employ nuclear weapons in the manner prescribed by the CONOPs. This is what it means to have an “effective deterrent as long as nuclear weapons exist.”

³⁹. In the U.S. military, the planning and conduct of military operations is anchored in the regional commands. The lack of attention given to nuclear issues by the regional commands has been a constant refrain for decades.

⁴⁰. See Appendix D.

⁴¹. Ibid.

SHAPING THE FORCE

The design principles for the nuclear posture recommended here are grounded in common sense—form follows function, get the right capabilities for critical jobs, and capabilities (actions) speak louder than declaratory policy (words). The two primary missions for U.S. nuclear weapons are deterrence and extended deterrence, and the future force should be structured accordingly. In order to execute its Measured Response strategy, both forces should have low-yield, accurate, special-effects (Enhanced Radiation Weapon [ERW], Electromagnetic Pulse [EMP], “clean,” etc.) options that are employable at the lower end of the nuclear continuum.

- *Strategic Deterrent Force (SDF)*, consisting of *Ohio*-replacement class submarines, Minuteman III ICBMs (or a follow-on ground-based strategic deterrent [GBSD]), and B-52s and B-2s (and a new nuclear-capable bomber at some point) is the highly survivable, assured destruction force that is the foundation on which U.S. nuclear deterrence resides. This is the “strategic triad” that deterred the Soviet Union during the Cold War and provides the United States its “nuclear shadow.”
 - Both the American people and policymaking elites have great confidence in the “second-to-none” status provided by its superior submarine-based nuclear forces. They are expensive, to be sure, but highly valued (and feared).
 - ICBMs stabilize the “balance of terror” by raising the bar for a successful pre-emption attack to very high levels.
 - ICBMs also hedge against the potential vulnerability of SLBMs (and their small number of aim points), because technological advances could render them visible.
 - Discriminate employment options, delivered both by gravity bombs and a new cruise missile, would be provided by the same suite of air-delivered discriminate warheads used for extended deterrence.
 - While most of the low-yield warheads would be deployed on forward-based forces, the SDF should have a capability for discriminate employment to ensure that the full range of nuclear attacks against the U.S. homeland can be responded to proportionately.
- *Extended Deterrent Force (EDF)*, consisting of forward-based and rapidly deployable platforms would enable both permanent and temporary “coupling” of the U.S. nuclear deterrent to host-nation security.
 - Dual-capable F-35As (based on land) and F-35Cs (based on carriers) would provide visible manifestations of U.S. extended deterrence and allied burden-sharing.
 - Discriminate employment options would be provided by a suite of low-yield, special-effects warheads (low collateral damage, enhanced radiation, earth penetration, electromagnetic pulse, and others as technology advances),

including possibly a smaller, shorter-range cruise missile that could be delivered by F-35s.

In this recommended 2025–2050 nuclear posture, bombers serve as an all-purpose hedge force that can enable, complement, and hedge for the other three “legs” (SLBMs, ICBMs, and dual-capable F-35s). They provide extended deterrence presence and discriminate nuclear options in regions where there are no forward-based or deployed F-35s. They can also provide weapons and mobility to deploying F-35As. As the traditional complement to SLBMs and ICBMs in the SDF, bombers are the most flexible leg of the strategic triad and can be used for signaling.

Currently, the United States has a nuclear force that consists of SLBMs, ICBMs, and two air-breathing variants (bombers and forward-based F-16s). This recommended 2025–2050 posture would have the same mix of systems, but with a much enhanced capability for discriminate nuclear responses and forward deployment.

The capabilities envisioned for this recommended nuclear posture include weapons intended to deter nuclear attacks at the lower end of the nuclear continuum; forward-based and forward-deployable delivery systems intended for extended deterrence; and assured destruction weapons that have intercontinental range, larger payloads, and are deployed in numbers sufficient to ensure stability and survivability. These are the right capabilities for nuclear deterrence in the twenty-first century because they counter the “nuclear offset” that U.S. adversaries might adopt for coping with U.S. conventional superiority.

SIZING THE FORCE

Years 2025–2050 are too far into the future to project specific numbers. There are too many uncertainties—the state of U.S.-Russian arms control, the number of regional nuclear powers, and the mix of conflict, competition, and cooperation between the major powers, to name a few. However, the following are offered as guidelines for sizing the 2025–2050 U.S. nuclear force:

- *Maintain rough parity with Russia.* Sustaining strategic stability, as well as regional stability in Europe, with a Russia that believed it had nuclear superiority would be significantly more difficult, if only because of the likely impact on Russia’s propensity to take risks.
- In order to build nuclear forces capable of responding proportionately to a nuclear attack at any rung of the escalatory ladder, the United States will have to address the significant disparity (with Russia) in nonstrategic nuclear forces. In light of Russia’s rather crude nuclear diplomacy during the 2014 Ukraine crisis, the United States needs to address this capability gap as it strengthens the portion of its nuclear forces that are tailored for the extended deterrence mission (to be discussed shortly).

- *Maintain nuclear superiority with China.* Despite a numerical disparity that might be 10 to one, China's assured-retaliation capability has gained it a strategic-stability relationship with the United States that, as DoD acknowledges in the 2010 NPR report, is similar to that between the United States and Russia.⁴² However, China's overt achievement of nuclear parity with the United States (and Russia) would likely trigger regional proliferation by American allies, much as the Soviets did in Europe during the Cold War. Avoiding this outcome could help explain China's relative moderation in growing its nuclear forces.
- *Maintain sufficient capability to cope simultaneously with nuclear-armed "regional rogues."* States willing to contemplate employing a nuclear weapon in a conflict with the United States will also be willing to "bandwagon" against the United States or "pile on" if the United States is distracted by another crisis.
 - A world of 18 nuclear powers could include, in addition to the current nine members, Iran, Saudi Arabia, Egypt, Turkey, Japan, South Korea, Poland, South Africa, and Brazil.
- *Maintain a smaller stockpile, which is enabled by responsive infrastructure.* The nuclear complex supporting a strategy of Measured Response is one that will design, develop, and produce new capabilities and new weapons. No longer will Cold War-era weapons have to be retained as a technological hedge in the stockpile, which now has about 5,000 weapons in it.

Under New START limits and counting rules, the United States will have 1,550 operationally deployed nuclear weapons (with intercontinental range). With a responsive infrastructure, it could have a similar number of reserve warheads. However, this does not address the disparity in U.S.-Russian nonstrategic nuclear weapons.

Final Thoughts

Nuclear weapons have awesome destructive power—so awesome, in fact, that the leaders of nation-states have been inhibited in their willingness to risk their actual employment. While this has often been characterized as the "nuclear taboo," the unwillingness to risk nuclear escalation has been a rational calculation, not a values-based one. The contestants during the Cold War were afraid to break the nuclear threshold because they believed it would escalate quickly to general nuclear war. This fear contributed greatly to keeping the Cold War cold.

U.S. conventional superiority, even if less dominant than it was at the time of the first Gulf War, is making the nuclear option more rationale for potential U.S. adversaries. For those countries that do not want to live under Pax Americana and do not want to lose a conventional conflict with the United States, a plausible move is to employ a nuclear

42. As former National Nuclear Security Administration (NNSA) administrator Linton Brooks has frequently observed, "Mutual vulnerability is not a policy; it's a fact."

weapon and break the nuclear threshold in a manner that demonstrates their resolve but without triggering the mass destruction of a nuclear war. The United States needs to undercut the desirability of the nuclear escalation to would-be opponents. By adopting the nuclear strategy and posture recommended here, the United States will have demonstrated its willingness (if necessary) to engage at the nuclear level and, by doing so, will make it less likely that its opponents will do so. As was the case during the Cold War, preparing for nuclear war, if done seriously, made it less likely to happen. Hopefully, that will prove to be the case in the “second nuclear age” as well.

**WITNESS RESPONSES TO QUESTIONS ASKED DURING
THE HEARING**

NOVEMBER 3, 2015

RESPONSES TO QUESTION SUBMITTED BY MR. AGUILAR

Dr. PAYNE. For decades, one of the common assumptions apparent in the U.S. public debate about nuclear weapons and policy has been that U.S. acquisition of a particular type of nuclear capability would serve only to inspire other states to do likewise. The typical claim based on this assumption is that the U.S. acquisition of a nuclear capability ultimately will lead nuclear-armed states to further expand their nuclear arsenals and inspire nuclear proliferation. In U.S. academic jargon, this thesis has come to be known as the “action-reaction” theory of the arms race, i.e., the U.S. acts, and others react similarly. It suggests that the U.S. ought not to move forward with new capabilities because doing so will harm U.S. security by initiating an “action-reaction” cycle of nuclear weapons that would not otherwise take place. Corresponding is the frequent claim that if the United States does not acquire a nuclear capability, others will refrain from doing so as well. This thesis has become accepted wisdom in many quarters in the United States. It posits a seemingly logical and obvious connection between U.S. actions and others’ reactions. The problem with this thesis, however, is that the actual facts of the history of the Cold War and subsequent history point in a different direction. The now-declassified (previously Top Secret) Cold War study, *History of the Strategic Arms Competition: 1945–1972*, Part 1, by the Office of the Secretary of Defense, Historical Office concludes as follows: “No consistent pattern can be found. That is the first important generalization to emerge from the history. The facts will not support the proposition that either the Soviet Union or the United States developed strategic forces only in direct immediate reaction to each other.... No sweeping generalizations about action-reaction cycles or inexorable Soviet designs or the momentum of science and technology can survive detailed examination of the sequence of events.” Despite this finding, the notion of an inexorable “action-reaction” U.S.-led nuclear arms race cycle has continued to dominate U.S. public policy debate. More recent available evidence similarly does not support the contention that U.S. acquisition of nuclear capabilities inspires nuclear proliferation. In fact, to the extent that there are identifiable linkages, it appears that: 1) some proliferant states seek WMD capabilities in response to superior U.S. conventional military capabilities, not U.S. nuclear capabilities; and, 2) that maintenance of a credible U.S. nuclear “extended deterrent” is a key to successful non-proliferation because it helps to assure some non-nuclear allies and friends of their security and thus reduces their incentives to seek their own independent nuclear capabilities. Maintaining a credible U.S. extended nuclear deterrent makes a tremendous contribution to nuclear nonproliferation. Finally, to suggest that a U.S. move toward the acquisition of “low-yield” weapons would inspire others to do so ignores the reported, decades-old Russian drive to acquire precisely such capabilities. In short, the United States cannot inspire Russia to move in that direction, because, according to available open information, Russia already has moved in that direction. And, in general, the Russian and Chinese nuclear modernization programs appear to precede by many years the Obama Administration’s fledgling nuclear modernization efforts. At this point, the United States cannot credibly be charged with leading an arms race. In short, the “action-reaction” thesis does not survive historical analysis in general; nor does the corresponding current characterization of prospective U.S. nuclear programs as inspiring a new “arms race.” [See page 19.]

Dr. BLECHMAN. I believe that the Russians have set a strategic trap for us and we are blindly falling into it. The Russians’ emphasis on nuclear weapons and nuclear war-fighting is the result of their conventional weakness. Despite their ongoing modernization program (now being cut back due to their economic problems), they are well behind the U.S. and its allies in advanced conventional technologies—from ISR to precision munitions to stealthy platforms to robotics, etc etc. They therefore emphasize nuclear weapons, to deter conventional warfare, just as NATO did in the 1950s and 1960s when it was in a similar position vis a vis the Soviet Union. But nuclear weapons are terrible weapons for fighting wars, regardless of their yield. Too many have to be used to defeat dispersed armored formations, and their use complicates communications, surveillance, guidance, etc—not only by the enemy, but by the side that uses them, as well. Instead of diverting resources to

nuclear forces, the U.S. and its allies should be exploring even more advanced conventional technologies to ensure we maintain our current advantages, as well as maintaining the high readiness of our forces. To my mind, the line between conventional and nuclear warfare should be kept as bright as possible. The U.S. should be clear it would respond to any nuclear use against its forces or its allies, no matter the yield of the weapons used, no matter the launch platform (long-range or short-range), with a devastating retaliatory nuclear response—not necessarily on the battlefield (which would mainly kill civilians in allied nations) but against military targets in Russia itself. [See page 19.]

QUESTIONS SUBMITTED BY MEMBERS POST HEARING

NOVEMBER 3, 2015

QUESTIONS SUBMITTED BY MR. ROGERS

Mr. ROGERS. Please explain why you believe the United States needs an accurate, lower-yield nuclear option? Is there a “gap” in U.S. capability between our lowest-yield nuclear weapons and our largest conventional weapons? How might Russia or another nuclear adversary exploit this in a crisis? In your opinion, does the U.S. having these types of capabilities make the use of a nuclear weapon—by either side in a crisis—more likely or less likely? Why?

Dr. MURDOCK. The principal role of U.S. nuclear weapons is to deter nuclear attacks against the United States and its allies. Deterring discriminate attacks at the lower end of the nuclear continuum depends critically on the United States having nuclear response options that are proportional to how an adversary might employ nuclear weapons against the United States and its allies. If the United States were only capable of disproportionate, high-collateral-damage retaliatory attacks, an adversary could believe that the United States would be “self-deterred” and would not respond-in-kind to a nuclear attack. Having credible nuclear response options across the nuclear continuum raises the nuclear threshold because it reduces the likelihood that an adversary will resort to nuclear weapons in the first place. There is a capability “gap” between our lowest-yield nuclear weapons and our largest conventional weapons. While the smallest variant of the B61 bomb is “only” 0.3 kt, that is still 20 times (21.5) more powerful than the largest-yield conventional weapon (the 30,000-pound Massive Ordnance Penetrator [MOP]). The B61-3/4 is slated to be replaced by the B61-12, which is also a variable-yield weapon with options that are not yet known. The “life-extension” program for the B61 bomb will likely result in a weapon that has at least two kiloton-or-smaller variations, but aside from greater accuracy, no additional “special effects” such as enhanced-radiation, earth-penetration, or low radiation, all of which appear to be in active development in Russia (and elsewhere). The United States is simply not preparing to counter how its potential adversaries are (or may be) preparing to counter its conventional superiority. Russia has explicitly adopted a first-use declaratory policy for its nuclear weapons as part of its “escalate-to-de-escalate” strategy that envisions employing a nuclear weapon to extricate itself from a conventional conflict that it is losing. By having discriminate, proportionate nuclear response options, the United States denies its potential adversaries the attractiveness of “going nuclear” and, in effect, makes it less likely that the nuclear threshold will be breached.

Mr. ROGERS. Dr. Payne, Dr. Murdock, and Mr. Colby, you each come to this problem from somewhat different strategic perspectives and assessments of the future strategic and threat environment, yet you all basically agree on the broad future contours of the best U.S. nuclear force. Does this consensus reflect a broader developing consensus among experts in the field? If so, what does this tell us?

Dr. MURDOCK. As several senior-level DOD officials have observed, U.S. nuclear weapons were our “first offset” as the U.S. and NATO coped with the conventional threat posed by the Warsaw Pact. Today, other nations (such as Russia) are increasing their reliance on nuclear weapons or seeking nuclear weapons (such as Iran) to “offset” or “counter” U.S. conventional superiority. For those of us in the policy community who take this dynamic interaction seriously, I do believe there is a growing consensus that the United States needs to develop and deploy new nuclear capabilities to ensure the credibility and effectiveness of its nuclear deterrent in the 21st century. A nuclear posture designed for the Cold War threat of the 1980s is almost, by definition, not the right nuclear posture for 2025–2050. However, I would not characterize this view as representing “a broader developing consensus among experts in the field.” Nuclear issues have always been controversial and hotly debated in the American policy community, even during the height of the Cold War. There are those who believe, as President Obama stated in his 2013 Berlin speech, that the United States will never be “truly secure” as long as nuclear weapons exist. Since I believe nuclear weapons will always exist, unless mankind invents a more lethal and effective instrument of destruction that makes them obsolete, I prefer to focus on increasing the safety and security of Americans in the nuclear era rather than on the fruitless (in my opinion) pursuit of a world without nuclear weapons. In my judgment, which I believe is increasingly shared by those who believe (as I

do) that the prospects of a highly proliferated world consisting of fifteen and more nuclear powers are increasing, the United States needs a nuclear strategy, policy and posture designed for these challenging times, not those in an increasingly distant past.

Mr. ROGERS. Are the strategy and reforms you propose responsible and prudent or would they too greatly lower the bar to nuclear use, and perhaps even incentivize use of nuclear weapons? Why isn't what you propose simply too dangerous?

How do you specifically see these capabilities as giving the United States the ability to deter an opponent's attempt to use nuclear capabilities in a limited fashion?

Dr. MURDOCK. The danger to be deterred is the employment of a nuclear weapon against the United States and its allies. Much as it did during the 1950s when it was opposed by the conventionally-superior Warsaw Pact, the United States and NATO deliberately did not adopt a no-first-use (NFU) policy with respect to nuclear weapons and, while remaining ambiguous about precisely what circumstances under which it would resort to the employment of nuclear weapons, relied upon its nuclear forces to deter major conventional aggression by the Soviet-led Warsaw Pact. At the height of the Cold War, the United States deployed about 7,000 nuclear weapons (often referred to as "tactical nuclear weapons" or TNWs) in NATO-Europe, which ensured that the Soviets knew that any major war in Europe would "go nuclear." While this had the effect of lowering the nuclear threshold, it was "responsible and prudent" to do so, because it deterred major aggression in Europe and helped keep the Cold War cold. Today, our potential adversaries are exploring how nuclear weapons could help them cope with the challenge of U.S. conventional superiority. Russia's military doctrine has already embraced the first-use of nuclear weapons to prevent losing a conventional conflict with a conventionally-superior adversary (the so-called "escalate-to-de-escalate" strategy). It would be imprudent and irresponsible for us not to consider how to counter this strategy. Developing and deploying discriminate nuclear capabilities raises the nuclear threshold because it reduces the attractiveness of nuclear escalation to our potential adversaries. The so-called "correlation of forces" has changed since the height of the Cold War, and our nuclear strategy, policy and posture must adapt to new strategic realities. Not doing so, in my view, is not only irresponsible, it raises nuclear risks and is potentially dangerous.

Mr. ROGERS. This subcommittee has spent a lot of time focused on the need for a responsive U.S. nuclear infrastructure. The administration seems to largely agree with us but has been glacially slow in implementing actions to fix it. Do you believe we need a nuclear infrastructure and enterprise that can quickly respond to geopolitical changes or technical failures in the stockpile? How should we define "responsiveness" of our nuclear enterprise going forward? What metrics should we use to measure responsiveness? Does a responsive infrastructure contribute to deterrence of potential adversaries?

Dr. MURDOCK. The need for a "responsive" nuclear infrastructure has been highlighted ever since it was named as one of the "legs" of the "New Triad" depicted in the 2001-2 Nuclear Posture Review (NPR). Although the term "New Triad" did not survive the passage of time, recognition that a responsive infrastructure is a critical enabler of a safe, secure, reliable and effective nuclear deterrent has survived. As I have advocated elsewhere (e.g., in QFRs 1-3) [preceding answers], I believe that the United States must develop and deploy new nuclear capabilities that are better suited for the strategic realities of the 21st century. This will not be possible without a healthy infrastructure capable of developing and producing new nuclear weapons. While it is the capabilities themselves, plus, of course, the will to use them if circumstances require it, that deter our adversaries, maintaining the necessary infrastructure for developing, acquiring and sustaining nuclear capabilities is necessary enabler. While defining the technical requirements of a "responsive" nuclear infrastructure is beyond my expertise, the recommendations contained in Project Atom are predicated on the assumption that the U.S. does, in fact, sustain the nuclear complex which, in turn, designs, develops and produces U.S. nuclear capabilities that are the foundation of nuclear deterrence.

Mr. ROGERS. Project Atom had an overarching constraint that the force postures the teams recommended must be possible within "approximately \$35 billion per year in constant 2013 dollars, comprising 4 to 5 percent of the defense budget." Do you believe your recommendations meet this constraint? Do you believe 4, 5, or 6 percent of the defense budget is an appropriate amount to be spending on nuclear deterrence, which DOD says is the nation's "highest priority defense mission"?

Dr. MURDOCK. In a report issued after Project Atom was released,¹ Todd Harrison and Evan Braden Montgomery conclude that even with the “bow wave” spending of \$12–13 billion per year during the 2020s for nuclear maintenance and sustainment, nuclear spending will “at most” account for only 5 percent of total defense spending. At this level of spending, they conclude that the U.S. nuclear program is not “unaffordable” and that “In the end, what the United States can or cannot afford depends on the priorities set by policymakers,” making the issue a “matter of strategy rather than cost.” I agree completely with this statement. Moreover, I do not believe that the “appropriate amount to be spending on nuclear deterrence” should be linked to a level of spending (such as 4, 5, or 6 percent) of the defense budget, but should be determined by the nature of the strategic environment and the role and value of U.S. nuclear weapons in that strategic context. I believe that the “overarching constraint” set by the Project Atom study the 2025–2050 nuclear posture should be possible within “approximately \$35 billion per year in constant 2013 dollars, comprising 4 to 5 percent of the defense budget” is both reasonable and achievable.

Mr. ROGERS. The Final Report of the Perry-Schlesinger commission on the Strategic Posture of the United States stated that, “Working with partners in the intelligence community, the laboratories should be in a position to advise national leadership on foreign nuclear weapons activities bearing on the interests of the United States and its allies. In short, the commission recommends that the laboratories be allowed to design, simulate, and experimentally assess foreign nuclear weapon designs for the purposes of defensive analysis.” A. Why, in your opinion, is this important? Do you support this effort? B. The Department of Energy is approximately 10 months late in submitting to Congress an annual report on how it will implement such a program. How important do you think it is that the Department promptly begin to implement this program?

Dr. MURDOCK. While I believe that the tracking and assessment of foreign nuclear weapons activity is primarily the responsibility of the intelligence community, I think that the laboratories have an important role to play, both from an intelligence perspective and as part of defense planning. Having a clear and technically competent understanding of non-U.S. nuclear weapon activity is critical for effective policymaking, intelligence analysis and weapons development and procurement. While I do not follow this issue closely and do not consider myself a subject-matter expert (SME) in this area, I support the Perry-Schlesinger recommendation and believe it should be implemented.

Mr. ROGERS. Please explain why you believe the United States needs an accurate, lower-yield nuclear option? Is there a “gap” in U.S. capability between our lowest-yield nuclear weapons and our largest conventional weapons? How might Russia or another nuclear adversary exploit this in a crisis? In your opinion, does the U.S. having these types of capabilities make the use of a nuclear weapon—by either side in a crisis—more likely or less likely? Why?

Dr. PAYNE. The current condition, in my opinion, is highly destabilizing—in part because of a “gap” in U.S. capabilities as perceived by Moscow. This gap is illustrated by the self-described Russian nuclear strategy of “escalating to de-escalate.” This strategy, as described by Moscow, in fact, is a nuclear first-use strategy, and would be used in situations in which Russia would threaten to employ, or employ a limited number of low-yield nuclear weapons. The apparent paucity of credible, low-yield U.S. nuclear options with which to deter such actions is a capability gap that, I believe, should be corrected. In short, Russia has a nuclear first-use strategy and a near monopoly in the associated relatively-limited tactical nuclear capabilities. Moving to correct that gap would be a stabilizing U.S. step. Flexible U.S. nuclear options, including an accurate, low-yield U.S. weapon could contribute to stability by helping to counter Russian nuclear strategy and deter Russian nuclear first use in a regional crisis. An accurate, low-yield U.S. weapon could be particularly helpful in this regard because Russian leaders appear now to expect that Russia would be able to employ accurate, low-yield tactical nuclear weapons in a crisis without triggering a large-scale U.S. nuclear response via central U.S. strategic systems. That Russian confidence appears to be based on the expectation that Russian employment of tactical nuclear weapons with relatively limited effects would not be sufficiently provocative and destructive to trigger a large-scale U.S. strategic nuclear response because U.S. leaders would be paralyzed by fear of subsequent Russian nuclear escalation. Russia appears to base this first-use strategy, at least in part, on the relative lack of available U.S. limited, tactical nuclear options. For deterrence

¹Todd Harrison and Evan Braden Montgomery, *The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond* (August 2015), Washington, DC: The Center for Strategic and Budgetary Assessments.

purposes, whether this Russian expectation seems reasonable to U.S. leaders is far less relevant than is the apparent Russian confidence in that expectation. This situation reflects a potentially critical gap in U.S. deterrent capabilities as perceived by Russian leaders and codified in reported Russian strategy. U.S. tactical nuclear capabilities that are relatively limited and discriminate could help fill that gap and deter Russia's first-use nuclear strategy. Movement in this direction by the United States would not be a matter of thoughtlessly mimicking Russian tactical nuclear deployments; rather it would be a step to counter Russian nuclear strategy in terms that are pertinent to Russian strategy and Russian leaders. The continuation of the current gap in U.S. capabilities, as apparently perceived by Russia, will likely validate Russian confidence in its tactical nuclear first-use strategy. Russia has been adamant that it will not give up its tactical nuclear capabilities, presumably because they are essential to its nuclear first-use strategy. Consequently, closing this gap via a renewed U.S. focus on forward-based tactical systems and accurate, low-yield nuclear options on a U.S. missile may well be critical to counter this Russian strategy and for U.S. efforts to deter nuclear war in a future crisis with Russia.

Mr. ROGERS. Dr. Payne, Dr. Murdock, and Mr. Colby, you each come to this problem from somewhat different strategic perspectives and assessments of the future strategic and threat environment, yet you all basically agree on the broad future contours of the best U.S. nuclear force. Does this consensus reflect a broader developing consensus among experts in the field? If so, what does this tell us?

Dr. PAYNE. Yes, it appears that a policy consensus is developing in support of modernizing the U.S. nuclear triad and U.S. forward-deployed nuclear capabilities. An increasingly broad spectrum of expert opinion recognizes that this modernization is now necessary because the realities of the contemporary threat environment are far from the optimistic post-Cold War expectations of a new and benign world order. A relatively broad and bipartisan consensus is developing that U.S. military capabilities, including nuclear, must adjust to the new realities of the post-Cold War era, including an aggressive, expansionist Russian grand strategy that is backed by coercive nuclear threats and an aggressive, expansionist Chinese grand strategy. Given the extraordinary costs of completely redesigning a new U.S. nuclear force for the twenty-first century, the modernization of the existing force posture seems to be the more affordable option for which a broad consensus of support is forming.

Mr. ROGERS. Are the strategy and reforms you propose responsible and prudent or would they too greatly lower the bar to nuclear use, and perhaps even incentivize use of nuclear weapons? Why isn't what you propose simply too dangerous?

How do you specifically see these capabilities as giving the United States the ability to deter an opponent's attempt to use nuclear capabilities in a limited fashion?

Dr. PAYNE. The strategy and reforms my colleagues and I propose are highly prudent. They would, I believe, be much more likely to raise "the bar to nuclear use" than lower it. They would likely reduce the incentives for tactical nuclear first use, as perceived by Russia and others. The reason why I believe this to be the case is presented in my answer to Question 7, which is repeated below.

The current condition, in my opinion, is highly destabilizing—in part because of a "gap" in U.S. capabilities as perceived by Moscow. This gap is illustrated by the self-described Russian nuclear strategy of "escalating to de-escalate." This strategy, as described by Moscow, in fact, is a nuclear first-use strategy, and would be used in situations in which Russia would threaten to employ, or employ a limited number of low-yield nuclear weapons. The apparent paucity of credible, low-yield U.S. nuclear options with which to deter such actions is a capability gap that, I believe, should be corrected. In short, Russia has a nuclear first-use strategy and a near monopoly in the associated relatively-limited tactical nuclear capabilities. Moving to correct that gap would be a stabilizing U.S. step. Flexible U.S. nuclear options, including an accurate, low-yield U.S. weapon could contribute to stability by helping to counter Russian nuclear strategy and deter Russian nuclear first use in a regional crisis. An accurate, low-yield U.S. weapon could be particularly helpful in this regard because Russian leaders appear now to expect that Russia would be able to employ accurate, low-yield tactical nuclear weapons in a crisis without triggering a large-scale U.S. nuclear response via central U.S. strategic systems. That Russian confidence appears to be based on the expectation that Russian employment of tactical nuclear weapons with relatively limited effects would not be sufficiently provocative and destructive to trigger a large-scale U.S. strategic nuclear response because U.S. leaders would be paralyzed by fear of subsequent Russian nuclear escalation. Russia appears to base this first-use strategy, at least in part, on the relative lack of available U.S. limited, tactical nuclear options. For deterrence purposes, whether this Russian expectation seems reasonable to U.S. leaders is far less relevant than is the apparent Russian confidence in that expectation. This situation reflects a potentially critical gap in U.S. deterrent capabilities as perceived by Russian leaders

and codified in reported Russian strategy. U.S. tactical nuclear capabilities that are relatively limited and discriminate could help fill that gap and deter Russia's first-use nuclear strategy. Movement in this direction by the United States would not be a matter of thoughtlessly mimicking Russian tactical nuclear deployments; rather it would be a step to counter Russian nuclear strategy in terms that are pertinent to Russian strategy and Russian leaders. The continuation of the current gap in U.S. capabilities, as apparently perceived by Russia, will likely validate Russian confidence in its tactical nuclear first-use strategy. Russia has been adamant that it will not give up its tactical nuclear capabilities, presumably because they are essential to its nuclear first-use strategy. Consequently, closing this gap via a renewed U.S. focus on forward-based tactical systems and accurate, low-yield nuclear options on a U.S. missile may well be critical to counter this Russian strategy and for U.S. efforts to deter nuclear war in a future crisis with Russia.

Mr. ROGERS. Should we have a U.S. deterrence strategy based on a declaratory policy of "You use a nuclear weapon against us or our allies, and you are history!" Would such a policy—and a force structure designed to carry it out—increase or decrease the deterrence provided by our nuclear capabilities? Would it lead to more security and stability or less?

Dr. PAYNE. A U.S. nuclear threat that says to an opponent "you are history" may sound robust, but it essentially would recreate the long-since rejected "Massive Retaliation" policy of the 1950s. "Massive Retaliation" should not be revived at this point as declaratory policy because it would, I believe, undermine U.S. deterrence goals, decrease stability and increase the potential for nuclear first use by a determined opponent. There are two fundamental reasons why such a U.S. deterrence policy has, for over four decades, been rejected by every Democratic and Republican administration.

First, the indiscriminate nuclear destruction of an opponent's population would be a gross violation of the Just War Doctrine and international law. This may seem to some to be a tangential matter when the subject is nuclear deterrence; but it rightly is taken seriously by leaders and military planners. Republican and Democratic administrations have agreed for decades that the U.S. should not intentionally engage in or base its planning on such indiscriminate nuclear targeting policies. The Obama administration's most recent unclassified nuclear employment policy continues this long-standing rejection of such deterrence strategies.

Second, an indiscriminate "you are history" declaratory policy would likely be insufficiently credible to deter effectively in many plausible circumstances. The United States can make nuclear threat declarations for deterrence purposes. But, the critical deterrence point is not whether the United States makes a nuclear threat that sounds robust to U.S. leaders, but whether U.S. threat declarations are judged by opponents to be credible enough to deter, i.e., do opponents actually believe the threat? If not, U.S. deterrence strategies cannot work by design.

To claim that U.S. nuclear deterrence goals can now be supported adequately by an old "Massive Retaliation"-type nuclear threat is to presume that opponents will believe that the U.S. would actually employ it as threatened. Yet, since the 1960s every U.S. administration has concluded, rightly in my opinion, that such a threat is unlikely to be credible to opponents in many plausible circumstances in which the U.S. nuclear deterrent must be effective—particularly including the extension of nuclear deterrence for allies, i.e., the U.S. "nuclear umbrella." The fundamental concern is that nuclear-armed opponents simply will not believe that the U.S. would execute such a massive nuclear strike unless U.S. cities had first been attacked massively because to do so would likely result in a massive nuclear reply against U.S. cities—a move no U.S. president would make. Thus, such a threat has been deemed incredible for many U.S. deterrence objectives.

In short, the credibility of a "Massive Retaliation" deterrence threat may be limited to a single type of nuclear threat to the United States. Yet a much broader spectrum of nuclear threats must be deterred, such as the use of tactical nuclear weapons against U.S. allies. To deter the many plausible nuclear threats that are short of a massive nuclear attack against U.S. cities, the U.S. has long judged that more limited and more flexible U.S. response options would be more credible, and thus more deterring. This is why U.S. force posture "flexibility" has long been considered a key ingredient for U.S. deterrence strategies.

Consequently, an alternative to "Massive Retaliation," known as a policy of "Flexible Response," was initiated by Secretary of Defense McNamara in the 1960's and codified in policy by Defense Secretary Schlesinger in 1974. It has had bipartisan support and rightly remains a fundamental element of reported U.S. policy. The basic point of Flexible Response is that the United States must have more diverse threat options than simply telling an opponent that "you are history" because such a threat may, in many important cases, lack the credibility necessary for effective

deterrence. The goal of having diverse options below a “Massive Retaliation” threshold is to strengthen the credibility of the U.S. nuclear deterrent and reduce the prospects for war. This approach seems particularly critical in the context of Russian nuclear strategy which emphasizes limited nuclear threats against U.S. allies and the employment of nuclear weapons in regional war, as discussed in my answers to Questions 7 and 9.

Mr. ROGERS. This subcommittee has spent a lot of time focused on the need for a responsive U.S. nuclear infrastructure. The administration seems to largely agree with us but has been glacially slow in implementing actions to fix it. Do you believe we need a nuclear infrastructure and enterprise that can quickly respond to geopolitical changes or technical failures in the stockpile? How should we define “responsiveness” of our nuclear enterprise going forward? What metrics should we use to measure responsiveness? Does a responsive infrastructure contribute to deterrence of potential adversaries?

Dr. PAYNE. A responsive infrastructure, if achieved, could make a critical contribution to U.S. deterrence goals. It is particularly important in the contemporary highly-dynamic threat environment. A responsive infrastructure would help the United States to adjust its force posture in a timely way to challenging political or technical developments. Such developments could, for example, include the rapid appearance of an unforeseen political or technical threat that would demand a corresponding adjustment in U.S. deterrence capabilities. The lack of a responsive infrastructure leaves the U.S. little able to respond in a timely way to such potential developments and, as a result, may contribute to the apparent attractiveness of an opponent’s “breakout” strategy. Such a strategy could appear particularly attractive to an opponent in certain situations, such as if a reliability problem in one or more legs of the U.S. triad occurs and cannot be corrected promptly. Deterrence is destabilized to the extent that an opponent sees a breakout strategy as a potentially viable option.

The standard of useful responsiveness is not fixed; it is determined by several factors—the most important of which is the character of the threat environment, political and technical. In the past, the National Nuclear Security Administration (NNSA) has had metrics for its responsiveness to be able to address unexpected problems. For example, in the early 2000s, NNSA reportedly set the goal of being able to design and develop a new type of nuclear warhead within five years.¹ Such metrics may provide useful measures against which to posture the nuclear infrastructure. It is not apparent if the NNSA has specific responsiveness metrics at this time.

Given the highly-dynamic contemporary threat environment and the diverse spectrum of threats, a responsive infrastructure should be considered a key component of U.S. deterrence capabilities.

Mr. ROGERS. You describe “adaptability” as the fundamental characteristic of your recommended nuclear strategy and posture. You define adaptability as “the combination of flexibility and resilience.” Why is adaptability your #1 requirement in a force structure? What are some actions we could take that increase adaptability in our nuclear force? What actions would you say decrease adaptability? Should we avoid actions that are irreversible—or at least very, very difficult to reverse?

Dr. PAYNE. Adaptability is the combination of the flexibility and resilience of the U.S. force posture (including infrastructure) and planning. Flexibility includes U.S. possession of a diversity of threat options; resilience includes the survivability of U.S. forces against the spectrum of threats and the ability to reconstitute U.S. forces in a timely manner. Some commentators recently have suggested that U.S. nuclear force posture flexibility should be avoided—labeling it a “Cold War” and “war-fighting” concept. This position reflects a complete misunderstanding of the value of adaptability as a U.S. force posture attribute to meet deterrence requirements in the 21st century. Adaptability, including flexibility is, in my opinion, the single most important metric for measuring the adequacy of U.S. forces for the deterrence of foes and the assurance of allies. The value of U.S. force posture adaptability is particularly apparent in its potential contribution to the credible deterrence of an opponent’s threats of nuclear escalation. The effectiveness of U.S. deterrence strategies to prevent war resides in their credibility, and nuclear deterrent threats that are rigid and narrow, vice flexible, are unlikely to be credible in many circumstances. Deterrent threats must be adaptable to the opponent and the contingency at hand and not structured rigidly as if for a single type of opponent and single type of crisis. In a highly-dynamic threat environment such as exists today, the U.S. require-

¹John Gordon, Under Secretary of Energy for Security and Administrator, National Nuclear Security Administration, Department of Energy, Prepared Statement for the Senate Armed Services, February 14, 2002, pp. 2, 5.

ments to deter foes and assure allies are diverse and can shift rapidly, and the credibility of U.S. deterrent threats may correspondingly depend on U.S. capabilities and planning that are sufficiently adaptable to shift as necessary to deter. As noted in the answer to question 10 above, a return to the rigidity of the U.S. "Massive Retaliation" deterrent threat would be destabilizing in those plausible cases wherein such a deterrent threat would simply lack credibility.

There are numerous steps that will strengthen adaptability, including for example, modernizing the triad with its diversity of platforms, adding U.S. advanced conventional force capabilities (e.g., CPGS), modernizing forward-based systems and increasing the responsiveness of the U.S. infrastructure. Adaptability is degraded by eliminating diverse U.S. options and capabilities in ways that are essentially irreversible. Unfortunately, U.S. strategic arms control policy often embraces the "irreversibility" of reductions as a measure of success. That is a realistic perspective only in the context of an essentially fixed and predictable threat environment in which it can be known that the capabilities eliminated will never again be of critical value. That is not the contemporary threat environment.

I should add that adaptability has been stressed by DOD officials as increasingly important for military capabilities in general. This is because of the significant expense of developing a new military weapons system which is expected to remain in service for decades. This, coupled with a highly dynamic environment and diverse threats, makes adaptability a prudent and effective approach to maintaining needed U.S. deterrence capabilities and U.S. military capabilities in general.

Mr. ROGERS. Project Atom had an overarching constraint that the force postures the teams recommended must be possible within "approximately \$35 billion per year in constant 2013 dollars, comprising 4 to 5 percent of the defense budget." Do you believe your recommendations meet this constraint? Do you believe 4, 5, or 6 percent of the defense budget is an appropriate amount to be spending on nuclear deterrence, which DOD says is the nation's "highest priority defense mission"?

Dr. PAYNE. My colleagues and my recommendations in the base case of Project Atom fit within the budget constraints designated in the study. The study also includes a case wherein we were asked to think outside those budget constraints. In general, the level of spending for the deterrence of foes and assurance of allies cannot reasonably be determined by identifying a fixed percentage of the DOD budget. A review of funding for U.S. strategic nuclear capabilities shows the cyclic nature of funding requirements. A large outlay was required in the early 1960s to create what became known as the nuclear triad. In the 1980s, another significant outlay was needed to modernize the aging triad. At present, we are facing a situation similar to that of the 1980s—although with a much smaller U.S. force posture. The existing triad has been life-extended and modernization is again needed. As noted in my answer to question #12, employing adaptability as a metric can help control costs and develop a nuclear force for deterrence and assurance that is relevant for the dynamic threat environment of the twenty-first century.

Identifying the most effective deterrence strategy cannot be done prudently on the basis of first defining the percentage of the DOD budget that will be devoted to this priority goal—budgets should follow strategy and strategic priorities, they should not be the driving factor. Rather, the character of the threat environment and the priority of various defense programs are the basic determinants of the appropriate budget share. This is a key point because ensuring effective nuclear deterrence has been identified as the highest defense priority by senior U.S. officials and the corresponding requirements for deterrence can shift dramatically depending on the threat environment. This prioritization is a reflection of severe emerging threats, including developments in Russia's foreign policy, nuclear doctrine and forces, and the basic fact that the deterrence of nuclear war must be considered an enduring priority goal. Indeed, if nuclear deterrence fails dramatically, many other U.S. goals and capabilities become irrelevant. Correspondingly, within broad margins, U.S. capabilities intended to deter severe threats warrant whatever budget commitment is needed to provide and sustain the capabilities judged critical to support that goal. Indeed, it is extremely fortunate that the goals of nuclear deterrence and assurance may be adequately supported at this point by a nuclear modernization program that demands such a modest percentage of the DOD budget—reportedly under 5 percent annually per current nuclear modernization plans through 2030. But, at the end of the day, that budget percentage should not be considered fixed because it must shift according to the threat environment and the continuing priority need for effective nuclear deterrence and assurance.

Mr. ROGERS. Why do we need a stand-off cruise missile like the LRSO if we will also have a penetrating bomber and a nuclear gravity bomb in the B61?

Dr. PAYNE. In general, a multiplicity of platforms and threat options contributes to the adaptability of the U.S. deterrent, which may be extremely important for

credible deterrence in a highly-dynamic threat environment as discussed in the answers to questions 10 and 12 above. Correspondingly, the United States needs a stand-off cruise missile like the LRSO to preserve and strengthen the flexibility and resilience of the U.S. deterrent in plausible circumstances. Stand-off weapons, for example, may be critical, now and in the future, to support a credible deterrent threat if enemy air defenses would essentially preclude the potential of U.S. bombers to threaten penetration to critical targets for deterrence purposes. In such circumstances, and others, stand-off cruise missiles could help ensure the effectiveness of the U.S. deterrent threat. In their absence, the bomber leg of the U.S. triad could be effectively shut down as a credible deterrent instrument. Such a condition would, in my opinion, be destabilizing because the bombers offer unique and important options for deterrence purposes. Specifically, the LRSO would provide a U.S. stand-off capability that adds to the inherent flexibility of the bomber capabilities and are accurate, discriminate, and, for an opponent, unpredictable in its route of flight. Given the long expected operational lifetime of a new U.S. strategic bomber, it would be highly imprudent to assume that LRSO is redundant because the bomber itself will be able to penetrate with gravity bombs throughout that lifetime in all potentially important contingencies.

Mr. ROGERS. The Final Report of the Perry-Schlesinger commission on the Strategic Posture of the United States stated that, "Working with partners in the intelligence community, the laboratories should be in a position to advise national leadership on foreign nuclear weapons activities bearing on the interests of the United States and its allies. In short, the commission recommends that the laboratories be allowed to design, simulate, and experimentally assess foreign nuclear weapon designs for the purposes of defensive analysis." A. Why, in your opinion, is this important? Do you support this effort? B. The Department of Energy is approximately 10 months late in submitting to Congress an annual report on how it will implement such a program. How important do you think it is that the Department promptly begin to implement this program?

Dr. PAYNE. I strongly support this effort because a critical ingredient of any effective deterrence strategy is an understanding of opponents' goals, intentions, determination and capabilities. Ignorance, misperceptions and misunderstandings of opponents are the basic reasons why deterrence strategies fail and wars take place that otherwise might have been deterred. This U.S. understanding of opponents seems particularly important with regard to opponents' nuclear capabilities because we must make our nuclear deterrence strategies as effective as possible. The ability of the U.S. national laboratories to understand foreign nuclear weapon designs, and thus foreign nuclear capabilities, is critical to understanding opponents' capabilities and intentions, and thus to establishing the most effective deterrence strategies possible. In addition, according to open reports by subject matter experts, design and development skills at the national laboratories have been atrophying as the result of no new development efforts for nuclear warheads. Having the design teams at the national laboratories design, assess, and analyze foreign nuclear capabilities would help maintain a skilled nuclear development workforce for the United States. This could be of great value in the future.

Mr. ROGERS. Please explain why you believe the United States needs an accurate, lower-yield nuclear option? Is there a "gap" in U.S. capability between our lowest-yield nuclear weapons and our largest conventional weapons? How might Russia or another nuclear adversary exploit this in a crisis? In your opinion, does the U.S. having these types of capabilities make the use of a nuclear weapon—by either side in a crisis—more likely or less likely? Why?

Mr. COLBY. The United States greatly benefits from having nuclear weapons that can be used relatively discriminately and with some potential for the control or manipulation of escalation (although such control can never be assured).

The ultimate deterrent threat of nuclear weapons lies in their capacity to wreak the most grievous, swift, and sure destruction upon an adversary, largely irrespective of the state or result of the sub-nuclear contest. Yet the execution of such a threat would be an act of the most brutal violence, an act that could only be justified—and likely would (and should) only be seriously considered—under the most extreme circumstances. Perhaps more to the point, such strikes would very plausibly call forth the matching response of an adversary possessed of nuclear weapons himself. The direct threat of nuclear attack against an adversary's urban infrastructure is therefore of only partial credibility, and of little credibility in situations short of the catastrophic.

This is a particular problem for the United States, which extends nuclear deterrence to several dozen allies. This extension of its "nuclear umbrella" means that the United States pledges to use nuclear weapons in situations that are very grave for its ally but not necessarily for itself. Washington extends its nuclear deterrent

in this fashion because it sees substantial stability, nonproliferation, and political benefits arising from bringing friendly states within its defensive envelope, and sees nuclear weapons as unique instruments of deterrence, particularly against the most serious forms of attack. Yet if large-scale nuclear strikes were the only options the United States possessed to respond to such attacks, this would mean that any nuclear use on behalf of an ally or for any important but still partial interest against the likes of Russia or China would immediately and directly raise the question of whether the United States should sacrifice New York for Tallinn, Los Angeles for Tokyo, or Washington for Warsaw.

This problem is particularly and increasingly important because potential U.S. adversaries such as Russia and China have survivable nuclear weapons of their own as well as sophisticated conventional forces. At root, the problem proceeds from the reality that the United States cannot realistically hope to destroy or eliminate the nuclear forces of these major power adversaries without running too great a risk of incurring a massive nuclear attack. We therefore must find ways of prevailing over these formidable potential opponents (even in limited terms) while inducing them to avoid using or at least to restrain their use of their nuclear arsenals. This is especially hard because these states appear to be planning to be able to employ their militaries against the United States—or, more specifically, its exposed allies and partners—in order to create and exploit political and military circumstances in which Washington may be unwilling to run the risks and incur the costs necessary to respond effectively. In brief, they hope to shift the burden of escalation onto the United States through the use of nuclear weapons, conventional forces, or both, in the hopes that the United States will ultimately decide to end the conflict on terms favorable to them.¹

This is not merely a theoretical challenge. Russia appears to be developing or refining a nuclear strategy modeled around precisely this logic. In the event of conflict with the West, Moscow appears to plan to have the option to “escalate to deescalate” the war by using nuclear weapons in limited ways designed to spook the West into halting the fight in a manner tantamount to acceding to the Kremlin’s demands.

The United States therefore needs ways of making its nuclear weapons relevant and effective as deterrents in situations short of those touching on its own survival yet in which its adversaries can inflict the most terrible harm upon it. How can the United States square this circle? The answer—albeit an inherently imperfect one—lies in a nuclear strategy that enables limited, graduated, and deliberate escalation. This strategy should be designed to demonstrate the determined U.S. will to respond to major attacks, including nuclear ones, against its allies and farther interests; impose targeted but increasingly severe harm on an opponent; and at the same time evidence the willingness to allow a tolerable de-escalation. Such a strategy of intelligent and focused escalation stands the best chance of demonstrating to an adversary that the United States has the ability and will to impose increasingly searing costs on him without launching a massive strike that could well amount to suicide.²

To pursue such a strategy, the United States needs limited nuclear options—that is, options designed to allow the use of nuclear weapons in ways that exploit the fear of but do not necessarily lead to general nuclear war. Such limitation of nuclear strikes can come in many forms—including the target type selected, the location of the target, the destructiveness of the weapons, and the number of weapons used, to name a few. The United States should therefore develop strategies, capabilities, and plans for the use of nuclear weapons in limited fashion, including ones suited for the emerging military-technological era, which means updating and modernizing our nuclear posture and architecture.

The role of such limited nuclear options, it is important to emphasize, is not to encourage nuclear use, let alone general nuclear war. Rather, it is to enable the United States to be able to gain the deterrent and stability benefits of nuclear weapons in such a way that their employment does not necessarily result in utter destruction. Possessing such an ability is vital because, if nuclear weapons cannot be used in any situations short of the cataclysmic, enterprising and risk-acceptant adversaries may well seek to gain advantage by raising the stakes against Washington

¹ For the author’s fuller description of his conception of this problem, see Elbridge Colby, “Preparing for Limited War,” *The National Interest* (November/December 2015), 11–22. NB: Given the relatively limited space available in these answers, references to the author’s additional work in this and ensuing footnotes are provided in case the reader is interested in the author’s further elaboration of the points raised.

² For a fuller description of the author’s logic for such a posture, see Elbridge Colby, “Reconciling Stability and Deterrence” in *Strategic Stability: Contending Interpretations*, ed. by Elbridge Colby and Michael Gerson (Carlisle Barracks, PA: U.S. Army War College Press, 2013), 47–83.

and daring us to respond massively. For instance, Russia might seek to establish a *fait accompli* in Eastern Europe and then employ limited nuclear strikes to compel the West to back down. Or China might try something similar in the Western Pacific with respect to the territory of U.S. allies. Without comparable capabilities, the United States could be left without a rational and effective riposte to such a strategy.

How, some will ask, would such a strategy not devolve into a nuclear tit-for-tat? Ideally, it would not because the United States would be *better* at limited nuclear war than its potential adversaries. Possessed of superior capacity for discrimination, control, and the infliction of harm in a nuclear war, the United States should have greater leverage over its potential adversaries, which will be the ones left forced to choose between de-escalation and a nuclear strike that will call forth a most devastating response. This is particularly relevant with respect to China, over which the United States still enjoys substantial advantages in these attributes.

But what about Russia, over which the United States does not enjoy such advantages, or a more formidably nuclear-armed China? How would such a strategy end or at least deescalate a war with an opponent over which the United States does not have meaningful nuclear leverage?

Much of the answer lies in the fielding of non-nuclear forces that can prevent the adversary from making gains, particularly easily and quickly, that can then be protected by nuclear escalation. If adversaries cannot take territory or valued things—or very much of them—from the United States and its allies, then a strategy of using limited nuclear attacks to force a war termination in place will yield them little or nothing.³

More broadly, however, we must bear in mind that no one knows how assuredly to control a limited nuclear war, and that it is widely understood that the attempt to control such a war could only ever be a highly uncertain and always combustible thing. Both sides in such a contest would have every incentive to find ways to avoid large-scale, let alone total, destruction. Accordingly everyone, even the most risk-tolerant gamblers, should be exceedingly reluctant to embark on such a course, and be particularly loathe to press a limited nuclear war too far. The Russians and Chinese both know this, as do we.

Thus, a nation should only embark on employment of such a perilous strategy that would risk its annihilation if it thinks it has dramatic advantages in the capability to conduct a limited nuclear war, if it perceives its adversary as basically bluffing over the issue at hand, or if the adversary has crossed a fundamental redline. The United States can prevent the Russians or Chinese from thinking any of these is the case if it has serious limited nuclear options, makes clear its resolve to defend its allies, and avoids crossing a redline that would prompt Moscow or Beijing to employ nuclear weapons to vindicate its most vital interests.

It must be admitted that the posture advocated here sounds extremely dangerous—and that its actual execution surely would be. But if the United States is resolved to continue its traditional extended deterrence and forward engagement approach, this is the most appropriate strategy to effectively deter aggression against U.S. allies and thereby promote stability and a tolerable peace. If we recall that war is generally a product of one side's perception of vulnerability or opportunity, this posture would diminish the likelihood of conflict by demonstrating to potential U.S. adversaries that any attempt to exploit through arms perceived U.S. weaknesses or deficit of resolve would invariably result in failure or the most painful loss.

Mr. ROGERS. Dr. Payne, Dr. Murdock, and Mr. Colby, you each come to this problem from somewhat different strategic perspectives and assessments of the future strategic and threat environment, yet you all basically agree on the broad future contours of the best U.S. nuclear force. Does this consensus reflect a broader developing consensus among experts in the field? If so, what does this tell us?

Mr. COLBY. Defense experts are increasingly coalescing around the recognition of the emergence of a more adversarial international political environment, particularly exhibited by Russia, China, Iran, and North Korea, and of a more contested military-technological landscape. Among defense specialists who believe the United States should maintain its traditional international position, this is leading to a sense that the United States needs to redouble its efforts to maintain its military edge.

³For an elaboration of this logic in the NATO-Russia context, see Elbridge A. Colby and Jonathan F. Solomon, "Facing Russia: Conventional Defence and Deterrence in Europe," *Survival*, (December 2015/January 2016), 21–50.

In the nuclear realm, this appears to be leading to a growing consensus that disarmament is decreasingly credible and relevant.⁴ Substantial consensus appears to have formed supporting the modernization of the U.S. nuclear arsenal, albeit with debate about the advisability of how or whether to modernize certain elements. While affordability is an issue, the general view increasingly appears to view this as more of a challenge of how best to manage concentrated costs in the 2020s rather than as an issue of the basic ability to pay for the systems as such.

With respect to more discriminate nuclear capabilities, most nuclear specialists recognize that the United States maintains such capabilities today and believe that the country should retain some capability for discriminate use going forward. Debate tends to center around how much discrimination and tailoring are required and how much investment is needed to address military-technological challenges posed by potential adversaries.

Mr. ROGERS. Are the strategy and reforms you propose responsible and prudent or would they too greatly lower the bar to nuclear use, and perhaps even incentivize use of nuclear weapons? Why isn't what you propose simply too dangerous?

How do you specifically see these capabilities as giving the United States the ability to deter an opponent's attempt to use nuclear capabilities in a limited fashion?

Mr. COLBY. There is a long-recognized inherent paradox in the reality that the most effective way to prevent war on acceptable terms is to be well-prepared to fight it. The Romans, for instance, captured this in their dictum that "if you wish for peace, prepare for war." It is this simple but compelling logic that underpins the longstanding consensus in the United States that the nation should field a peerless military, one that can fight and prevail not only in wars touching on our own particular concerns but also in those impinging upon the vital interests of our many allies and partners.

If U.S. and allied conventional forces could reasonably be expected to perform this daunting task at acceptable cost and risk over the long-term, then we would be bound to seriously consider relegating nuclear weapons to a relatively marginal role in our national security posture. This is not, however, a responsible expectation in light of the nature of the emerging international geopolitical and military-technological environments.

Politically, we continue to have fundamental disagreements with nations possessed of the most serious kinds of military capability—disagreements that could worsen and even result in war.⁵ In light of this reality that war is possible, the United States needs a meaningful and effective defense policy and posture to deal with the formidable militaries these nations are developing.

This policy and posture must include a nuclear component because of the actual and latent military strength—both nuclear and conventional—of these potential adversaries. Russia, for instance, is thinking of ways to use nuclear weapons in discriminate and pointed ways to terminate a conflict with the United States and NATO on terms it prefers. China, meanwhile, may over the longer term gain conventional advantage in areas touching on the vital interests of U.S. allies, leading the United States to want to rely more on its nuclear forces for extended deterrence.⁶ Finally, North Korea is also developing a larger and more sophisticated nuclear force potentially capable of surviving U.S. attacks and being employed in a targeted and iterated fashion against U.S. and allied targets.

These adversary strategies all raise the chances that, in the event of conflict, the United States would feel impelled to consider use of nuclear weapons—either in response to adversary employment or in order to "escalate to deescalate" a conventional conflict the United States and its allies were losing. If the United States only had totalistic options for employing nuclear weapons in such circumstances, or even if it lacked sufficient confidence in the precision with which it could deliver limited strikes, it might find itself without a sensible way of responding to very clever—but also very plausible—adversary strategies.

For instance, Moscow might think that it could establish a conventional *fait accompli* in NATO territory and then threaten to use or actually employ nuclear weapons in a limited way to try to frighten the West into backing down. Or China

⁴For the author's critique of the feasibility and advisability of nuclear abolition, see Elbridge Colby, "World Order Critique of Nuclear Abolition," in the forthcoming *Global Nuclear Disarmament Strategic, Political, and Regional Perspectives*, ed. by Nik Hynek and Michael Smetana (London, UK: Routledge, 2016).

⁵For a fuller argument for this point, see Elbridge Colby, "Why Nuclear Deterrence is Still Relevant," in *Thinking About Deterrence: Enduring Questions in a Time of Rising Powers, Rogue Regimes, and Terrorism*, ed. by Adam Lowther (Maxwell AFB, Alabama: Air University Press, 2013), 51–74.

⁶See Elbridge Colby, "Asia Goes Nuclear," *The National Interest* (January/February 2015), 28–37.

might seek to seize the territory of U.S. allies in the Western Pacific using conventional forces, block U.S. attempts to intervene, and then dare the United States to resort to nuclear weapons. In both cases, the adversary would seek to push the onus of escalation onto the United States. Left only with large-scale nuclear options, this burden would seem even heavier than it would already be—and perhaps too heavy.⁷ In such a case, the United States and its allies might determine that concession would be a more prudent course than deliberate escalation.

To avoid this disastrous outcome, the United States should arm itself with capabilities and strategies, including limited nuclear options, to respond appropriately to any such attempts on the part of its potential opponents. By demonstrating that the United States cannot realistically be left without effective recourse to adversary strategies, such strength should help deter potential adversaries from embarking upon such challenges in the first place.

This is because, while it may be true that wars sometimes happen because of accident, it is far more common that they result because at least one side believes that it has a strategy that *can work*. Thus, the best way to dissuade an opponent from embarking on military action is to persuade him that such an endeavor will result in outright defeat or, at least, will result in costs and risks out of proportion to whatever gains he might win. This is precisely the logic of having tailorable nuclear options, which demonstrate to potential U.S. opponents that the United States cannot be forced to choose between capitulation and catastrophic escalation.

Mr. ROGERS. Why doesn't the existing U.S. nuclear force have sufficient capacity for discrimination? Why do we need to change from today's posture, platforms, and arsenal? How do you specifically see these capabilities as giving the United States the ability to deter an opponent's attempt to use nuclear capabilities in a limited fashion?

Mr. COLBY. The current U.S. nuclear force has substantial elements of discrimination, including variable yield weapons, and the ability to deliver such weapons in a relatively controlled fashion with relatively tailored effects. But these capabilities are relatively modest and in key respects are declining in effectiveness and relevance in light of the evolving military-technological environment and particularly the improving military power of potential adversaries. The U.S. posture for flexible nuclear use thus needs to be updated.

Specifically, greater variability of effects (particularly yield) should be introduced into the U.S. weapons arsenal; U.S. nuclear forces should be equipped to penetrate increasingly sophisticated adversary air defense networks; and the aging U.S. nuclear-related command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) system should be modernized to support limited nuclear operations.

The ideal U.S. posture should allow the President to order nuclear strikes to conform to specific requirements with very high confidence that such strikes will penetrate and achieve the desired effect. That is, the President should be able to command that strikes hit a certain target or set of targets with a particular (especially lower) level of destructiveness, with particular types of effects, and should have very high confidence that the attacks will result in the kinds of results anticipated. Lacking confidence that such strikes will penetrate enemy defenses or that they will have the desired effect upon penetration, the United States may feel compelled to launch larger strikes in order to achieve even rather limited effects—potentially undermining or even negating the purpose of having capabilities for discriminate attack.

Accordingly, and particularly in light of advances in potential adversary air defenses, the United States would benefit from having more capacity for discriminate strikes across the force, including the ballistic missile force. Thus the United States should equip some portion of the Trident II D5 SLBM force for lower-yield attack, and should ensure that the future airborne leg of the Triad can deliver lower-yield strikes as well as strikes of varying effect from multiple platforms, including via gravity bombs and the long-range standoff missile (LRSO). Such a multiplicity of attack options should give more optionality for attack typologies and also give higher confidence that such strikes would penetrate and take place as planned. This should give the United States greater leverage in “manipulating risk” or matching and blunting an adversary's ability to do so.

At the same time, the United States should ensure that its aging C4ISR capabilities are modernized and optimized to enable support to limited nuclear operations through crucial functions such as ISR, battle damage assessment, command and control, and communications both with friendly forces and an adversary.

⁷ For a fuller exploration of this logic, see Colby, “Preparing for Limited War.”

Mr. ROGERS. This subcommittee has spent a lot of time focused on the need for a responsive U.S. nuclear infrastructure. The administration seems to largely agree with us but has been glacially slow in implementing actions to fix it. Do you believe we need a nuclear infrastructure and enterprise that can quickly respond to geopolitical changes or technical failures in the stockpile? How should we define “responsiveness” of our nuclear enterprise going forward? What metrics should we use to measure responsiveness? Does a responsive infrastructure contribute to deterrence of potential adversaries?

Mr. COLBY. A responsive nuclear infrastructure and enterprise able to meet the country’s national strategic requirements are vital for the nation’s deterrent and thus for our national security. Responsiveness should be defined as the capability, capacity, and agility to turn over the stockpile roughly every ten years and to respond to emerging threats over the medium term.

Mr. ROGERS. Project Atom had an overarching constraint that the force postures the teams recommended must be possible within “approximately \$35 billion per year in constant 2013 dollars, comprising 4 to 5 percent of the defense budget.” Do you believe your recommendations meet this constraint? Do you believe 4, 5, or 6 percent of the defense budget is an appropriate amount to be spending on nuclear deterrence, which DOD says is the nation’s “highest priority defense mission”?

Mr. COLBY. I did not perform the budgetary analysis required to answer this question. In my report, I supported the replacement, modernization, or sustainment of the nuclear Triad, the associated warheads, and the nuclear command and control system and related components. This modernization effort has been budgeted to consume less than five percent of the defense budget over the next few decades, which I believe is a more than reasonable price to pay for the cornerstone of the nation and our allies’ security.⁸ The additional expenditures stemming from my emphasis on discrimination, control, and flexibility in the nuclear force would, I assess, cost a relatively small additional amount compared to the total cost of nuclear forces. This is because such capacities are often largely resident in existing warheads, modern C4ISR systems, and contemporary delivery platforms. Fuller exploitation of these capabilities would be more a matter of developing latent capabilities rather than of initiating wholly new programs or pursuing revolutionary technologies, which are commonly culprits behind cost overruns.

Mr. ROGERS. Why do we need a stand-off cruise missile like the LRSO if we will also have a penetrating bomber and a nuclear gravity bomb in the B61?

Mr. COLBY. The nation would greatly benefit from having a standoff cruise missile replacement in the LRSO for two main reasons. First, we cannot be sure of the penetration capability of low-observable aircraft in light of advancing adversary air defenses. This means we would be ill-advised to place all our bomber leg eggs in the basket of the long-range penetrating bomber, as important and promising as that program is. Instead, a standoff penetrating nuclear-armed munition will give us much greater assurance that the United States can attack targets throughout an adversary’s territory, and can do so discriminately. It is therefore highly important that the LRSO be mounted with a warhead capable of variable yield settings.

Second, investment in a standoff munition is likely to be an asset from a cost competition point of view. That is, adversaries will have their air defense challenge significantly complicated by the need to defend not only against low-observable bombers but also standoff munitions with different characteristics, concepts of operations, and signatures. Given the central importance of airpower to our nation’s way of war, burdening adversaries’ air defense problems as much as possible in a cost-competitive way is an important objective for the United States.

More broadly, we must maintain considerable humility about the nature of technological change in the coming decades. Given the absolutely central importance to our nation’s security and geopolitical posture of fielding a nuclear force able to respond reliably and also capable of conducting limited operations, we are well-served by erring on the side of redundancy. If the LRSO program threatened to break the back of the defense budget, we might come to a different judgment. But it will not. The weapon appears to build on an established concept—the standoff penetrating missile—and carries that forward, adapting it to a new technological era. Such a program can both benefit and draw from comparable conventional programs—and may sensibly include a conventional variant itself. It therefore seems well worth the investment required.

⁸See, for instance, the study by leading experts from the Center for Strategic and Budgetary Assessments on costs of nuclear forces, Todd Harrison and Evan Branden Montgomery, “The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond?” (Center for Strategic and Budgetary Assessments, 2015), 33.

Mr. ROGERS. The Final Report of the Perry-Schlesinger commission on the Strategic Posture of the United States stated that, "Working with partners in the intelligence community, the laboratories should be in a position to advise national leadership on foreign nuclear weapons activities bearing on the interests of the United States and its allies. In short, the commission recommends that the laboratories be allowed to design, simulate, and experimentally assess foreign nuclear weapon designs for the purposes of defensive analysis." A. Why, in your opinion, is this important? Do you support this effort? B. The Department of Energy is approximately 10 months late in submitting to Congress an annual report on how it will implement such a program. How important do you think it is that the Department promptly begin to implement this program?

Mr. COLBY. I firmly support this effort. While I have not made a special study of this problem, the United States requires a solid understanding of what adversaries may be doing with their nuclear forces, including the effects produced by their weapons. The United States should be prepared for the potential that an adversary may seek to use nuclear weapons not simply in well-understood but also in surprising or unconventional ways—for instance with very little kinetic effect—that could nonetheless have gravely negative implications for U.S. forces or interests. The United States is highly unlikely to be adequately prepared without allowing the national laboratories to conduct design efforts for the purpose of defensive analysis.

It is therefore very important for the Department to begin promptly to implement this program.

Mr. ROGERS. During the hearing you indicated that you think that the United States could respond to a limited Russian nuclear strike with a comparable strike of its own using a strategic bomber—and that this response would be "just as compelling as being able to respond with a tactical weapon delivered by a fighter jet." Does this indicate that you think a limited nuclear war is possible? If so, what implications does this have for U.S. nuclear force planning? If not, why do you think such a response would be prudent or advisable?

Dr. BLECHMAN. If Russia were to carry out a limited nuclear strike it would be essential for the U.S. and, if in Europe, NATO to respond in kind. If the U.S. did not respond it might encourage Russian leaders to believe they could regain territory once part of the Soviet Union through nuclear coercion and, when necessary, use. I believe that any use of nuclear weapons would carry with it a grave risk of continuing escalation—the normal fog of war would be multiplied many times on a nuclear battlefield. Even so, I support the NATO policy of deterring, and, if necessary responding to, nuclear use with its own nuclear forces.

The question is whether such a response should be made with tactical weapons pre-deployed in Europe. Maintaining such a capability will require significant expenditures at a time when security budgets face many competing needs. Moreover, it is hard for me to believe that the German, Belgian, or Dutch governments would permit their crews and aircraft to respond to a Russian nuclear use—presumably in Eastern Europe, with nuclear weapons now stored on their territory. Indeed, their fighters would have a hard time penetrating Russian air defenses. Far preferable in my view, would be to deploy U.S. nuclear-armed B-2 bombers to bases in Europe during the crisis that led up to the conflict, both to signal to the Russians that we are prepared for a nuclear exchange and, if necessary, to conduct nuclear strikes in response to the Russian first use.

Mr. ROGERS. Please describe what response you would recommend if Russia carries out, in a regional confrontation with the U.S. in, say, the Baltics, their "escalate-to-deescalate" doctrine and used a single, low-yield nuclear weapon? If the U.S. responds with increased conventional forces, what response do you recommend if Russia continued to use discriminate, low-yield nuclear strikes on such U.S. forces as they deploy? Should we respond in a conventional-only fashion, a limited nuclear fashion, or with a large and comprehensive nuclear retaliation?

Dr. BLECHMAN. First, I believe it is essential to strengthen NATO's capabilities in the Baltic nations and adjoining countries so that Russian leaders do not misperceive an opportunity to carry out a quick and successful strike. This strengthening should include rapid implementation of the European Very High Readiness Taskforce and the stationing of advanced elements and equipment in Poland, the deployment of equipment for one U.S. armored brigade in each of the Baltic states and the rotational deployments of battalions from those brigades to exercise with local forces, the deployment of the divisional headquarters and support forces to fill out the division in Poland, the rotational deployment of U.S. fighter squadrons to the Baltic nations, Poland, and Romania, and the stationing of necessary Air Force support units for those squadrons in those countries.

Second, if despite these pre-deployments, a conflict were to break out in the region and the Russians, facing conventional defeat utilized one or more nuclear weapons

in conformance with their stated doctrine, I believe the U.S./NATO should respond with the same number of weapons against Russian military targets in the battle zone. As nuclear weapons are not particularly effective war-fighting weapons, hopefully, the two sides would come to their senses after only a few had been used and negotiate an end to the conflict. If the Russians continued to use nuclear weapons after the U.S./NATO had responded in kind, I would recommend that we consider striking military targets in Russia itself, recognizing this would raise the danger of a Russian strike against the U.S.

Mr. ROGERS. This subcommittee has spent a lot of time focused on the need for a responsive U.S. nuclear infrastructure. The administration seems to largely agree with us but has been glacially slow in implementing actions to fix it. Do you believe we need a nuclear infrastructure and enterprise that can quickly respond to geopolitical changes or technical failures in the stockpile? How should we define "responsiveness" of our nuclear enterprise going forward? What metrics should we use to measure responsiveness? Does a responsive infrastructure contribute to deterrence of potential adversaries?

Dr. BLECHMAN. I disagree with the premise of the question. The administration has been modernizing the nuclear infrastructure across the board, in line with the requirements agreed to by the secretaries of defense and energy at the end of the second George W. Bush administration. The apparently "glacial" pace has more to do with the underestimates of the time and money required to implement the plan made at the time it was put together than any reluctance on the part of the current administration to carry out the plan.

Personally, I believe the plan is too far-reaching. Given the planned size of U.S. nuclear forces under the START agreement, and the possibility of further reductions in the future, I believe that several elements of the infrastructure modernization plan could be modified and reduced in cost.

The responsiveness of the infrastructure depends on the resources allotted to it. If there were a change in the geo-political environment well beyond the changes we have seen already, it would be possible to modernize and expand the infrastructure rapidly by throwing resources at it—just as we did in the Manhattan Project. Personally, I don't see any need for such actions now or in the future, but it would be possible.

I have never seen any evidence that adversaries pay any attention to the infrastructure in the context of deterrence. Leaders of all nations believe the U.S. is a very wealthy and resourceful country that will do whatever is necessary to ensure its security.

Mr. ROGERS. Project Atom had an overarching constraint that the force postures the teams recommended must be possible within "approximately \$35 billion per year in constant 2013 dollars, comprising 4 to 5 percent of the defense budget." Do you believe your recommendations meet this constraint? Do you believe 4, 5, or 6 percent of the defense budget is an appropriate amount to be spending on nuclear deterrence, which DOD says is the nation's "highest priority defense mission"?

Dr. BLECHMAN. The nuclear force posture I recommend could be implemented and maintained for less than \$35 billion per year, freeing resource for more pressing needs, such as modernizing conventional forces and maintaining a high state of conventional readiness. That is not the case, I believe, for the force postures recommended by my colleagues in Project Atom nor for the nuclear modernization plans now being pursued by the Department of Defense which will like reach or exceed \$50 billion per year in the 2020s if fully implemented on the schedules now contemplated.

Nuclear deterrence is certainly a high priority defense mission, but there are many other needs to ensure our security. It is imperative to replace the aging fighter force at a rapid pace, to maintain a ship-building budget adequate to stem further reductions in the size of the navy, and to avoid reductions in ground forces greater than those already planned, as well as to modernize the Army's helicopter fleet. In addition, we should be spending more, not less as now planned, on advanced research and development of new technologies so that we can maintain our conventional advantages over potential enemies. We also should be allocating greater resources to homeland security, the FBI, and to the State Department—all crucial in the fight against terrorism. These needs are far more important than the rapid, cross-the-board modernization now planned for the nuclear forces.

Mr. ROGERS. During the hearing you stated, "If the U.S. does not maintain conventional superiority, then we'd have to look at alternative strategies." Can you elaborate on what is meant by alternative strategies?

A. Considering the widespread employment and increasingly effective nature of the anti-access/area-denial platforms fielded by potential adversaries, particularly China, aimed solely at degrading U.S. conventional superiority in local spheres of

influence, such as the Taiwan Straits, how does this trend affect your proposed recommendations for U.S. nuclear force structure and posture given your assumption of U.S. conventional superiority through 2050? If U.S. conventional forces are unable to operate, thus unable to deter, in certain areas, do the policies you recommend in Project Atom change?

Dr. BLECHMAN. An alternative defense strategy would be to return to the Eisenhower Administration of massive retaliation, building larger strategic nuclear forces and threatening their use if our or our allies' vital national interests are threatened. This should be coupled with an all-out effort to develop boost-phase missile defenses, probably involving massive satellite constellations equipped with laser weapons. I'd hasten to add that this would be a very dangerous world—remember the several Berlin confrontations in the 1950s, as well as confrontations with China over the Offshore Islands, etc.

With regard to "A", I believe the anti-access/area-denial capabilities of our potential adversaries have been exaggerated in the public literature. They are certainly working on them, but Russia is nowhere near such technical capabilities and China has a long way to go. Locating, targeting, and hitting an aircraft carrier in a war-fighting configuration (i.e., emissions limited) is not nearly as easy as some make out, and there are other many other systems that could be used to defend allies in regions close to China. Needless to say, China's capabilities will improve over time, even if far more slowly than many postulate. The way to respond, in my view, is NOT to allocate additional resources to nuclear forces but, rather, to invest in advanced capabilities—such as ISR, EW, cyber, lasers, and space defense—that can enable us to maintain our conventional superiority.

Mr. ROGERS. The Final Report of the Perry-Schlesinger commission on the Strategic Posture of the United States stated that, "Working with partners in the intelligence community, the laboratories should be in a position to advise national leadership on foreign nuclear weapons activities bearing on the interests of the United States and its allies. In short, the commission recommends that the laboratories be allowed to design, simulate, and experimentally assess foreign nuclear weapon designs for the purposes of defensive analysis." A. Why, in your opinion, is this important? Do you support this effort? B. The Department of Energy is approximately 10 months late in submitting to Congress an annual report on how it will implement such a program. How important do you think it is that the Department promptly begin to implement this program?

Dr. BLECHMAN. I'm sorry, but I'm not sufficiently familiar with warhead designs or the capabilities of our laboratories to answer this question.

Mr. ROGERS. Please describe what response you would recommend if Russia carries out, in a regional confrontation with the U.S. in, say, the Baltics, their "escalate-to-deescalate" doctrine and used a single, low-yield nuclear weapon? If the U.S. responds with increased conventional forces, what response do you recommend if Russia continued to use discriminate, low-yield nuclear strikes on such U.S. forces as they deploy? Should we respond in a conventional-only fashion, a limited nuclear fashion, or with a large and comprehensive nuclear retaliation?

Dr. MOUNT. Any decision to employ a nuclear weapon would depend substantially on the circumstances. A nonlethal demonstration blast is a very different circumstance than a large strike that produces mass casualties. Properly calibrating the U.S. response will depend on a great deal of information about the initial strike—including location, target, military casualties, civilian casualties, yield, delivery vehicle, and other factors. In any event, the United States has strong reasons to refrain from nuclear use. The need to favorably resolve the conflict at hand, the desire to preserve a reputation that will serve the United States in future crises, and the enduring U.S. interest in the stability of the international system may in some circumstances favor a solely conventional response. First, nuclear retaliation could harm the ability of U.S. policymakers to prevail in the conflict at hand by damaging alliance cohesion, diluting international opprobrium, and complicate the maneuver of U.S. forces. Because a nuclear strike would be an inefficient and ineffective means of defending allied territory, a conventional response may be a better means of prevailing in the conflict at hand. Secondly, the United States would not want to suggest to other states that they could force a nuclear response from Washington at will. Thirdly, the United States has a deep interest in a world where nuclear weapons remain confined to the margins of international interaction. Developing and using low-yield nuclear weapons would make it more likely that other countries followed suit. In many circumstances, these reasons in favor of restraint may be outweighed by reasons in favor of nuclear use. At each step in the escalation ladder, the U.S. president will attempt to prevent a wider nuclear exchange. It is not clear—and there may be no way of knowing—whether retaliation or restraint is likelier to precipitate a nuclear war. The regrettable fact is that follow-on nuclear

use will remain a possibility whether or not the United States retaliates with nuclear weapons. In short, there is no simple or automatic answer to the question of nuclear retaliation. The decision should weigh all U.S. interests at stake, including the long-term U.S. interest in a world where nuclear proliferation and use is rare and stigmatized. Given these interests in nuclear restraint, retaliation should certainly be authorized as a last resort, when the leadership has a reasonable certainty that nuclear use is strictly necessary to secure vital national security interests.

Mr. ROGERS. During the hearing you warned against “shifting the bounds of this competition into the nuclear domain,” because “you legitimize Vladimir Putin’s reckless movement of nuclear capabilities and his sort of—and his very reckless risk-taking.” You suggest we counter Russia’s hybrid strategy with conventional strategies of our own. An old maxim occurs to me here: “the enemy gets a vote.” What happens if Mr. Putin votes and is not deterred by our conventional or hybrid counter-moves, and carries out his “escalate-to-deescalate” strategy? Where does that leave us?

Dr. MOUNT. It is certainly true that Mr. Putin gets a vote in strategic competition. However, the United States also gets a vote about the domain in which that competition takes place—and we ought to cast in a way that advantages our interests. In recent years, Russia has repeatedly made destabilizing and irresponsible statements regarding its nuclear arsenal. At tense moments, it has threatened to alert its forces and to deploy them close to NATO territory. However, U.S. and NATO responses should continue to emphasize the strength of our conventional deterrent. Russian rhetorical strategy hopes to provoke a nuclear response from the United States in order to shift the competition from the conventional level (where Russia is weak) to the nuclear level (where Russian capabilities are relatively more developed). If the United States takes the bait and deploys new systems closer to Russian territory, it will only legitimate Putin’s gamble and provoke further nuclear brinksmanship, including arms racing behavior. This would create a divide in the alliance between countries that favor a nuclear response and those that do not, distracting attention from the difficult task of formulating a robust package of steps to promote conventional deterrence. Furthermore, it would dilute international disapproval of Russia’s nuclear brinksmanship, creating new problems for U.S. diplomats who are attempting to hold together an ailing nonproliferation regime. Russia’s strategy is specifically designed to cover aggression at the subconventional level by generating friction at the nuclear level. U.S. nuclear forces cannot deter paramilitary operations, low-level cyber operations, or other hybrid actions designed to destabilize the countries that form NATO’s eastern borders. The United States should continue its current policy for confronting Russian hostility—by prepositioning equipment, training allied militaries, and improving readiness to ensure that NATO can defend itself if challenged.

QUESTIONS SUBMITTED BY MR. COOPER

Mr. COOPER. What do you view as the greatest risks to strategic stability?

Dr. MURDOCK. While there is little consensus on how to define “strategic stability,” most would agree that strategic stability is desirable, particularly for status quo powers like the United States. In my most recent work (as yet unpublished), I’ve characterized the current and near-term security environment as “Growing Great Power Competition in an Age of Rising Disorder.” In my assessment, the three greatest near-term threats to international order and stability are Russia, China and Islamic Extremism, with the latter taking two forms: as a state-like actor threatening regional stability and as an ideological movement that conducts and inspires terrorism. Nuclear-armed regional “rogue” states (such as North Korea today and perhaps Iran in the future) also pose significant challenges to stability, both global and regional. While nuclear terrorism has been elevated by some as the top “nuclear danger,” I believe that the risks to strategic stability from nuclear-armed states is rising and constitute the “greatest” risk, in part because the effort involved in non-state actors’ acquisition of a nuclear device is both harder than initially thought and getting harder because of improved nuclear material security.

Mr. COOPER. What do you view as the greatest risks to strategic stability?

Dr. PAYNE. The greatest risks to contemporary strategic stability are the expansionist goals, nuclear doctrines and growing nuclear capabilities of states hostile to the United States and allies, as discussed in Question 7 above. In particular, the nuclear doctrines of key states suggest the belief that their threats of nuclear employment or actual nuclear employment are viable options in support of expansionist foreign policies designed to enlarge their respective areas of geopolitical dominance.

I believe that Russia and China seek to use nuclear coercive threats and their significantly growing nuclear arsenals to support expansionist foreign policies that are intended to destroy the geopolitical structures in place in Europe and Asia since the end of World War II. These Russian and Chinese goals and means place key U.S. allies and interests in increasingly vulnerable and risky positions, and create the prospects for regional crises that could escalate to nuclear war in the absence of a strong U.S. deterrent. In short, I believe the greatest threats to stability stem from the prospects that Russia and/or China will overreach in their respective expansionism and use of nuclear coercion in the belief that the United States and allies will concede to their threats and military activities. The greatest risks to stability follow from these Russian and Chinese goals and the apparent fact that both intend to support those goals with coercive nuclear threats. The large expenditures Russia and China have been devoting to developing and deploying new nuclear forces underscores the apparent high value they place on these capabilities.

Mr. COOPER. What do you view as the greatest risks to strategic stability?

Mr. COLBY. I understand strategic stability to be a situation in which, between two states possessed of survivable large-scale nuclear forces, neither side has an incentive to use nuclear weapons except for vindication of its vital interests.⁹ That is, unlike some conceptions of strategic stability, I am as concerned about specifying the conditions under which nuclear use would be appropriate as those under which they would not. This is because, for strategic stability to be a constructive concept, it must capture the positive elements of the so-called “nuclear revolution”—those that promote peace and stability—while seeking to minimize or eliminate the essentially ancillary or accidental reasons that states might employ nuclear weapons. Without serving both masters, carrying through on such a conception risks focusing too much on narrowing the legitimate uses of nuclear weapons to the extent that major sub-nuclear aggression could become increasingly “thinkable”—which would itself be the most likely route to nuclear use.

In a “strategically stable” situation, the presence of nuclear weapons would effectively deter war, aggression, and coercion, but the weapons themselves would only be used for these purposes rather than for essentially peripheral or accidental reasons. We should want a situation in which both we and those nations with which we are in a relationship of strategic stability—essentially Russia and China—would only use nuclear weapons because we really wanted to telegraph to the other side that it had crossed a most fundamental red line—and not for any other reason.

I therefore see threats to strategic stability arising from two sides. On one side are the very real and increasingly serious risks that certain capabilities, postures, and actions of one or both sides might result in miscalculation, accident, misperception and emotion leading to nuclear escalation that nobody really seeks. These are the kinds of peripheral or accidental reasons to use nuclear weapons that we should want to eliminate or at least minimize as a potential cause of employment.

Because of the rapidly evolving military-technological environment and the unfortunately growing possibility of conflict between the United States and China or Russia, I am increasingly worried about the potential for such factors to lead to unnecessary nuclear use. In particular, I fear that the evolution of military technology and national military postures pose a rising possibility of generating misperception, misunderstanding, or undue anxieties on the part of one or more of these states with respect to their core capabilities or valued assets to such a degree that such concerns could lead to the fearful side using nuclear weapons without the other side understanding that its actions would generate such a response.

For instance, I am concerned that the introduction of new technologies and capabilities into domains such as cyberspace and space/counterspace could cause one or more of these states to worry about the effectiveness and reliability of its/their nuclear command and control systems, which might impel it/them to consider using nuclear weapons earlier in a conflict—even if the other side did not intend to undermine this vital capability. Likewise, I fear that the United States and these other states do not share common perceptions of what is and what is not escalatory—including which targets are considered of particular value and which are not—which could also lead to this kind of essentially unnecessary or accidental nuclear employment.

Because of these concerns, I believe that governmental (especially) and non-governmental efforts to understand, develop, and shape U.S., Russian, and Chinese perceptions of these risks, and to minimize each state's reasons for nuclear use while protecting U.S.—and, to the degree obligatory—other states' interests is an increas-

⁹For a fuller description of my understanding of “strategic stability,” see Colby, “Reconciling Stability and Deterrence.”

ingly valuable exercise. Ideally, each of these states should think of using its nuclear forces only to vindicate its truly vital interests—and not for “use or lose” or other such solely military-operational reasons.

I also worry, however, about the risks to the other side of the strategic stability balancing equation. For instance, I am worried that nuclear weapons will be so marginalized in national—particularly U.S.—policy that an adversary may unduly discount the probability of U.S. use in the event the United States is seriously challenged. As crucial as it is to minimize the chances that nuclear weapons will be used for less than fundamental reasons, it is equally critical to reinforce the perception that nuclear weapons could very well be used on behalf of precisely such fundamental reasons. If adversaries—particularly U.S. adversaries—do not fully understand or believe this, then we run the risk that they are more likely to do things more inimical to U.S. interests, things that could well lead to war and indeed nuclear war. Thus if we do not adequately foreshadow our will to use nuclear weapons in the face of acts that gravely threaten our vital interests, we risk courting the very circumstances we seek to avoid by sidelining nuclear weapons in our national policies.

For this reason, I believe that we should shift our discussion of and policies regarding nuclear weapons away from a focus on “reducing” their role and on actively pursuing a world without nuclear weapons. These stances, coupled with much of the discourse about nuclear weapons in and around the U.S. government, telegraph—sometimes quite strongly—to friend and foe that the United States might balk at using nuclear weapons, even in the “extreme circumstances” the 2010 Nuclear Posture Review Report rightly set as the only conditions under which the United States would contemplate such employment. Instead, the United States should concentrate on “minimizing” its reliance on nuclear weapons and talk about the importance of promoting “stability” and responsible stewardship of such destructive weapons—objectives that are consistent with the equally important emphasis the United States should give to telegraphing its will and capability to use nuclear weapons if sufficiently provoked. Under this rubric, capabilities, such as those for discriminate use, that indicate the U.S. resolve and ability to use nuclear weapons can thus contribute to rather than detract from stability.

Mr. COOPER. Former Vice-Chair of the Joint Chiefs of Staff Admiral Winnefeld noted in a June 2015 hearing before our subcommittee that “I would say that it is very important that the Russians understand that far from being deescalatory, first use of nuclear weapons in a conflict like that, it risks uncontrolled escalation . . . it is almost impossible to completely predict what the outcome would be of such a use of nuclear weapons, however small.” What are the odds that we could control escalation? And what are the risks of using a small nuclear weapon to “de-escalate” a conflict? And what are the risks of introducing more “usable” weapon into the nuclear deterrent?

Dr. BLECHMAN. Any use of any nuclear weapon, no matter how small, would raise grave risks of uncontrolled escalation. The “fog of war,” present in any conflict, would be multiplied many times if nuclear weapons were used because of their effects on sensors and communications. In addition, it’s hard to understand how the two sides would bring the conflict to a close. If Russia initiated nuclear use, NATO would almost certainly feel compelled to respond in kind. Perhaps the two sides would come to their senses at that point, but it’s just as compelling to assume that the Russians might try again, this time escalating against new types of targets. We recently simulated a conflict in Estonia in which the Russian side used two nuclear weapons against NATO military targets and NATO responded with two weapons of its own against Russian military targets, all on Estonian territory. We assumed that the war ended at that point. Even such a small conflict (4 weapons total) resulted in roughly 100,000 fatalities, 70 percent of which were civilians, and the destruction of one-half of Estonia’s GDP. Nuclear weapons are not particularly effective weapons against military targets; precision conventional munitions are. Nukes are good for one thing—destroying large areas and killing everything within the area. On the other hand, I do not believe that introducing lower yield or more accurate weapons (“more usable”) makes nuclear use any more likely. A decision to use a nuclear weapon would be such a historic and difficult one, because of the risks of escalation, that questions about yield etc pale in comparison.

Mr. COOPER. What do you view as the greatest risks to strategic stability?

Dr. BLECHMAN. Currently, I believe the greatest risks to strategic stability come from the irresponsible statements and nuclear threats of Russian leaders, and from the provocative behavior of their nuclear-capable aircraft, ships, and submarines. During the Cold War, military commanders on the two sides worked out arrangements to avoid inadvertent accidents or provocations by their forces. The Russians now seem to be deliberately violating those agreements and risking clashes—using

this bravado to cover up their conventional inferiority. In response, some government officials and so-called “experts” in NATO countries are urging that the alliance reemphasize its tactical nuclear posture and even move tactical nuclear weapons farther to the East. Any such action only plays into the Russians’ game. The more effective NATO action would be to strengthen its conventional capabilities to promptly defend the Baltic states and other member nations east of Germany, and to provide Ukraine with the means to defend itself from further Russian aggression.

Mr. COOPER. Do you believe we need to forward-deploy additional nuclear weapons? Why/why not?

Dr. BLECHMAN. I do not think we need to deploy additional nuclear weapons overseas and, in fact, think we should permit the weapons we now deploy in Europe to live out their natural lifetimes (about ten more years) and then withdraw and dismantle them. When Soviet armored forces threatened NATO on the intra-German border, stationing U.S. nuclear warheads in Germany and other NATO members made some sense to add credibility to the Alliance’s then-first use policy. Now, however, that any Russian aggression would take place far to the East of Germany, it is unrealistic to believe that the countries in which these U.S. warheads are stationed would permit their aircraft and crews to deliver nuclear strikes in a war with Russia. Moreover, the aircraft planned to deliver them would have a difficult time penetrating Russian air defenses. Deterrence of Russian nuclear use and, if necessary, response to any such use can be carried out by U.S. strategic forces far more effectively than by the handful of U.S. tactical weapons now in Europe. If a crisis were to break out threatening a war involving Russia and a member of NATO, U.S. B-2 bombers armed with nuclear weapons could be stationed in Europe as a signal to Russia not to consider initiating a nuclear conflict and, if necessary, to be used in response to a Russian attack. Forward-deploying nuclear weapons in the Pacific would be particularly counter-productive as it would be viewed as extremely provocative by China and make diplomatic solutions to the conflicts in that region virtually impossible.

Mr. COOPER. What are the benefits for the United States of ratifying the Comprehensive Nuclear Test Ban Treaty?

Dr. BLECHMAN. China has stated repeatedly that it would ratify the CTBT if the U.S. does it first. As China has had only a fraction of the nuclear tests than the U.S., and has never tested the warhead now being deployed on its new ICBMs, it would be a real advantage to the U.S. to place an obstacle in the way of further nuclear tests by China. Further, if the U.S. and China were to ratify the Treaty, it would put additional pressure on the six additional states necessary for the treaty to enter into force—placing a permanent ban on further nuclear developments. This would reinforce the taboo on nuclear use and make the world a far safer place.

Mr. COOPER. Former Vice-Chair of the Joint Chiefs of Staff Admiral Winnefeld noted in a June 2015 hearing before our subcommittee that “I would say that it is very important that the Russians understand that far from being deescalatory, first use of nuclear weapons in a conflict like that, it risks uncontrolled escalation . . . it is almost impossible to completely predict what the outcome would be of such a use of nuclear weapons, however small.” What are the odds that we could control escalation? And what are the risks of using a small nuclear weapon to “de-escalate” a conflict? And what are the risks of introducing more “usable” weapon into the nuclear deterrent?

Dr. MOUNT. In June, Deputy Secretary of Defense Bob Work warned Russia that, “anyone who thinks they can control escalation through the use of nuclear weapons is literally playing with fire.” This applies to the U.S. defense planners as well, who have long understood that nuclear escalation is unpredictable and hazardous and should be employed only as a last resort. Russia developed this policy of escalate-to-deescalate as a means of compensating for conventional inferiority (like we did with President Eisenhower’s New Look policy in the 1950s)—the United States has a far stronger hand at the conventional level and as a result has less need to resort to highly risky nuclear gambits. The introduction of new “usable” weapons holds tremendous risks. They would demonstrate to the rest of the world that even with our enormous advantage in conventional forces, we feel that it is necessary to procure usable nuclear forces. Nonnuclear countries would feel emboldened to seek nuclear weapons, while nuclear countries would race to make their forces more usable. Work continued by saying, “escalation is escalation, and nuclear use would be the ultimate escalation.” There is scant evidence that either we or the Russians would understand a “tactical” nuclear strike any differently from one delivered by other means. For this reason, it is not clear that any nuclear weapon is more or less usable than another: any use of a nuclear weapon would hold enormous risks and would provide no assurance that it would have a positive or calculable effect on a crisis.

Mr. COOPER. What do you view as the greatest risks to strategic stability?

Dr. MOUNT. Almost by definition, the greatest risk to strategic stability is the belief that nuclear deterrence can be denied, circumvented, or overcome. There are many examples of this today. The urge to conduct a nuclear or nonnuclear preventive strike against an enemy's arsenal, the development of nonnuclear weapons that threaten nuclear systems (including cyber and hypersonics), refusals to accept mutual vulnerability, development of new nuclear capabilities, and the belief that nuclear escalation can be controlled—each of these trends to a greater or lesser extent undermines nuclear deterrence to the detriment of strategic stability. Strategic stability between nuclear powers depends on a willingness to accept vulnerability; refusal to do so does not increase a country's security but only increases the risk that a nuclear weapon will be used.

Mr. COOPER. Do you believe we need to forward-deploy additional nuclear weapons? Why/why not?

Dr. MOUNT. Absolutely not. The United States currently possesses an ability to strike any point on earth at short notice with a variety of warhead yields. Forward deployment of nuclear weapons, whether in Asia or in Europe, would not enhance this capability. The political signal it would send to our allies in either region would be that conventional deterrence and defense is impossible and it would alienate allies like in both regions who are skeptical of the utility of nuclear weapons. Instead, new deployments to either region would almost certainly provoke reciprocal steps from adversaries, which would in turn be seen as threats to the United States. The United States should not send the signal that it believes its strategic capabilities are incredible as threats and require enhancement; instead, we should maintain that nuclear weapons are not useful tools for the resolution of political disputes and resolutely demonstrate our ability to defend against any attack with conventional means.

Mr. COOPER. What are the benefits for the United States of ratifying the Comprehensive Nuclear Test Ban Treaty?

Dr. MOUNT. Ratification of the Comprehensive Test Ban Treaty is critical to national security over the long term. The United States has a very strong interest in minimizing the influence of nuclear weapons and to prevent the spread of nuclear technology around the world. Ratifying the CTBT would decrease the likelihood that U.S. adversaries would develop new capabilities and make it almost certain that the international community would detect and punish any clandestine nuclear test. The International Monitoring System requires that the CTBT enter into force in order to proceed to complete, test, and validate its extensive network of monitoring stations and laboratories, 282 of which are currently in place—84% of the total system. With 337 facilities planned in 89 countries, the IMS is truly a wonder of the modern world and an indispensable tool in the effort to prevent the world's most dangerous weapons from being used against the U.S. homeland or the U.S. Armed Forces. Moreover, ratification of the CTBT would strengthen the U.S. commitment to the global nuclear nonproliferation regime at a time when it is highly vulnerable. Every year, the NNSA's Stockpile Stewardship program yields new knowledge about the physics of nuclear explosions, a program which is unmatched anywhere in the world. In this way, ratifying the CTBT would help to lock in the American advantage in nuclear technology, preventing other countries from developing efficient and miniaturized warheads. By any measure, the CTBT is in the American interest.

QUESTIONS SUBMITTED BY MR. GARAMENDI

Mr. GARAMENDI. Your plans all assume constant funding of 4–5% of the defense budget over the next 30 years. Uncertain fiscal times beg the question: what would you do with less? How would your plans change with 10%, 30%, or 50% less funding? Asked another way, what is the least important part of your nuclear posture?

Dr. MURDOCK. As I have indicated in QFR #5, I believe that 4–5% of the defense budget to sustain and modernize a safe, secure, reliable and effective nuclear deterrence is certainly affordable, and as, in the words of former Secretary of Defense Hagel, the nation's "highest priority defense mission" should be adequately sourced. In my opinion, the defense budget would have to be cut well below the Budget Control Act caps before I would consider reducing the U.S. nuclear budget significantly below the \$35 billion per year in 2013 dollars level assumed in the Project Atom study effort. That having been said and in the spirit of being responsive, not all elements of the current nuclear posture (SLBMs, ICBMs, dual-capable bombers and tactical aircraft) are of equal value in my opinion. Since the United States must retain an assured retaliation capability, the survivability of U.S. nuclear forces is a key requirement. Currently, the U.S. relies on SLBMs to meet this need, but there are alternatives such as mobile ICBMs, an option that I believe should be explored,

in part because replacing the SLBM “leg” consumes over 60 percent of the nuclear modernization budget. ICBMs provide both stability (by raising the bar for any preemptive attack) and a hedge against possible SLBM vulnerability, plus the near-term cost of sustaining ICBMs is low. The U.S. Air Force is already committed to a new fleet of penetrating bombers for conventional attack missions, and making it nuclear-capable is relatively inexpensive, in part because the B61 bomb life extension is well under way. I think it is critical that the Air Force plans for making F-35A nuclear capable be implemented, since I believe that the risks of a highly-proliferated world are increasing, which will increase the need for forward-deployed U.S. nuclear weapons. While cost considerations should be a factor in determining what the future U.S. nuclear posture should be, I repeat what I said before—the U.S. needs a safe, secure, reliable and effective nuclear force and can afford to pay the price for it at levels of defense spending anywhere near the current budget.

Mr. GARAMENDI. What role do conventional strike capabilities play in U.S. deterrence and extended deterrence? What are our allies’ expectations about the weapons with which we will respond in the event that mutual defense is necessary?

Dr. MURDOCK. U.S. conventional precision strike capabilities are critical to how this nation conducts military operations and are a key contributor to the margin of military superiority that the United States currently possesses. However, when it comes to the deterrence of nuclear attacks against the United States and its allies, I do not believe that U.S. conventional strike capabilities play much of a role, if any. It is the threat of nuclear retaliation that deters nuclear attacks. In the event that an ally under the “U.S. nuclear umbrella” was attacked with a nuclear weapon by a regional adversary, that ally would be disappointed if the United States responded with a conventional-only attack. The principal, but not sole, purpose of U.S. nuclear weapons is to deter nuclear attacks against the U.S. and its allies. U.S. conventional strikes, in my view, do not figure in this equation, although they may increase the need for U.S. nuclear deterrence—to counter U.S. conventional superiority (particularly in precision strike), potential adversaries will increase their reliance on nuclear weapons to “offset” the U.S. conventional advantage, which, in turn, makes it necessary for the United States to increase the credibility and effectiveness of its nuclear deterrent.

Mr. GARAMENDI. Current policy states that the United States will respond in exceptional circumstances to non-nuclear attacks with nuclear weapons. Should the United States adopt a “no first use” policy, which would deemphasize the role that nuclear weapons play in our overall strategic posture? Would it help or hurt our interactions with other nuclear weapons states?

Dr. MURDOCK. The United States has always maintained a policy of “strategic ambiguity” with respect to the precise circumstances under which the President would authorize the employment of a U.S. nuclear weapon. This made sense during the Cold War, when our deterrent posture in NATO clearly implied that we would use a nuclear weapon in response to major Soviet conventional aggression; and it makes sense today, even though U.S. conventional superiority makes it unlikely that the United States would be the first to employ a nuclear weapon in a non-nuclear conflict. No one can predict with great confidence what future contingencies might be so stressful, urgent and existential in nature that a President might contemplate employing a nuclear weapon. Moreover, those circumstances are so exceptional that what we say during peacetime about what our policy would be under those circumstances has little foundation in past history. In a fundamental sense, we really don’t know what a future President would or should do in that unprecedented situation. Conflicts between nuclear-armed states will always have a “nuclear shadow” over them, which, as far as I am concerned, makes “strategic ambiguity” both prescriptive (as a policy recommendation) and descriptive (as a description of the circumstances in which a nuclear weapon might be employed).

Mr. GARAMENDI. What importance do our NATO allies place in the presence of forward-deployed nuclear weapons in Europe? Would they be satisfied with the nuclear force structure we currently offer our Asian allies?

Dr. MURDOCK. I believe that the importance of forward-deployed U.S. nuclear weapons has been undervalued both today and during the Cold War. At the height of the Cold War, the United States had about 7,000 nuclear weapons deployed in NATO-Europe and 3,000 nuclear weapons deployed in the Pacific theater, including almost 1,000 weapons on the Korean peninsula. The physical presence of these nuclear weapons ensured that a major war would “go nuclear” and possibly involve nuclear attacks on the homelands of the Communist aggressors without directly involving the American homeland. The “coupling” of the U.S. nuclear deterrent and the security of our allies worked. Russia’s aggressive behavior toward Ukraine (including the illegal seizure of Crimea) and North Korea’s ascension to the world’s “nuclear club” has raised nuclear anxieties both in Europe, particularly in the

“frontline states” on Russia’s border, and in Asia. I quote from my Project Atom report: When security anxieties are acute, “reassurance” or “assurance” is most reliably provided by credible extended deterrence—if the adversaries of American allies are deterred, the allies will be assured. Deterring regional adversaries from “going nuclear” requires credible nuclear responses to their nuclear attack options. Forward deploying a robust set of discriminate nuclear response options conveys the message that the United States will “respond in kind” and proportionately to nuclear attacks on its allies. The credibility of that message is reinforced because the U.S. homeland would not be engaged in the U.S. response to a nuclear attack on a regional ally, which leaves the burden on the regional aggressor to escalate to the level of “homeland exchanges.” The price, however, for this more credible U.S. “nuclear umbrella,” is likely to the ally’s willingness to host U.S. nuclear weapons. This is what will constitute “nuclear burden sharing” in 2025–2050. An Asan Institute public opinion poll taken at the same time that a U.S. B–2 overflew Seoul indicated that over half of the Japanese public wanted U.S. nuclear weapons re-deployed to South Korea and, failing that, would want their own nuclear weapon. If security circumstances should worsen as the competition between the great powers intensifies, I expect that none of our allies “will be satisfied with the nuclear force structure we currently offer our Asian allies.”

Mr. GARAMENDI. How would you recommend the United States structure our forces to respond to Russia’s nuclear deescalation policy? How could the United States respond without developing new tactical nuclear capabilities?

Dr. MURDOCK. In my Project Atom report, I made the following argument: In “the second nuclear age,” potential U.S. adversaries are thinking through how they might actually employ a nuclear weapon, both early in a conflict and in a discriminate manner, to get the United States to “back off” in a conflict. U.S. nuclear forces were designed for a global conflict involving the exchange of thousands of high-yield weapons, not limited exchanges of low-yield weapons. Since most U.S. nuclear response options are large, “dirty,” and inflict significant collateral damage, the United States might be “self-deterred” and not respond “in kind” to discriminate nuclear attacks. U.S. conventional superiority establishes escalation control for the United States at the conventional level and causes its adversaries to think about breaking the nuclear threshold. The United States needs discriminate nuclear options at all rungs of the escalation ladder to make that option unattractive as well. Russia’s “nuclear deescalation policy” envisions that Russia will employ a nuclear weapons (that is, nuclear escalation) in order to de-escalate a conflict with a conventionally-superior adversary. I believe that a credible and effective deterrent to this policy is a robust set of discriminate options so that the United States can “respond in kind” and proportionately to any Russian employment of a nuclear weapons. I believe this means developing new nuclear capabilities because the Russian are known to be developing and procuring nuclear weapons that are not in the current U.S. nuclear inventory. While I have never liked the term “tactical nuclear weapon” because any use of a nuclear weapon will have strategic consequences, I believe that an effective and credible response to Russia’s “nuclear deescalation policy” will require that the United States develop “new tactical nuclear capabilities.” Doing so will communicate to the Russians that we are preparing for this contingency and are ready to respond with a proportionate nuclear response to any Russian nuclear attack. This will strengthen the U.S. nuclear deterrent; failing to do so will weaken it.

Mr. GARAMENDI. Your plans all assume constant funding of 4–5% of the defense budget over the next 30 years. Uncertain fiscal times beg the question: what would you do with less? How would your plans change with 10%, 30%, or 50% less funding? Asked another way, what is the least important part of your nuclear posture?

Dr. PAYNE. Part of my response to Question 13 also is pertinent in response to this question and thus is repeated here. Identifying the most effective deterrence strategy cannot be done prudently on the basis of first defining the percentage of the DOD budget that will be devoted to this priority goal—budgets should follow strategy and strategic priorities, they should not be the driving factor. Rather, the character of the threat environment and the priority of various defense programs are the basic determinants of the appropriate budget share. This is a key point because ensuring effective nuclear deterrence has been identified as the highest defense priority by senior U.S. officials and the corresponding requirements for deterrence can shift dramatically depending on the threat environment. This prioritization is a reflection of severe emerging threats, including developments in Russia’s foreign policy, nuclear doctrine and forces, and the basic fact that the deterrence of nuclear war must be considered an enduring priority goal. Indeed, if nuclear deterrence fails dramatically, many other U.S. goals and capabilities become irrelevant. Correspondingly, within broad margins, U.S. capabilities intended to

deter severe threats warrant whatever budget commitment is needed to provide and sustain the capabilities judged critical to support that goal. Indeed, it is extremely fortunate that the goals of nuclear deterrence and assurance may be adequately supported at this point by a nuclear modernization program that demands such a modest percentage of the DOD budget—reportedly under 5 percent annually per current nuclear modernization plans through 2030. But, at the end of the day, that budget percentage should not be considered fixed because it must shift according to the threat environment and the continuing priority need for effective nuclear deterrence and assurance.

My recommendation for dealing with any unavoidable budget cuts follows from my basic conclusion that the most important metric for the adequacy of the U.S. nuclear posture is its flexibility and resilience. Consequently, if cost reductions must be taken from the already small fraction of the DOD budget devoted to U.S. nuclear capabilities, reductions should be done so as to preserve as much as possible the flexibility and resilience of the U.S. nuclear posture. Thus, for example, in my view, sustaining the nuclear triad, forward-based DCA and a diversity of threat options would be priorities in any necessary budget reductions because those capabilities contribute significantly to U.S. adaptability.

Mr. GARAMENDI. What role do conventional strike capabilities play in U.S. deterrence and extended deterrence? What are our allies' expectations about the weapons with which we will respond in the event that mutual defense is necessary?

Dr. PAYNE. Conventional strategic threat options are an important ingredient in a flexible U.S. deterrent force posture. Indeed, one of my recommendations is for greater U.S. emphasis on CPGS threat options. Depending on the case, optimal deterrence strategies may take advantage of U.S. non-military threats, conventional force threats, nuclear threats, or a combination of these. The importance of U.S. conventional threats in any particular contingency will depend on the unique details of that contingency. But, in some plausible cases U.S. conventional deterrent threats may be sufficiently credible and lethal to support U.S. deterrence goals. In those cases, it will be fully reasonable for the United States to rely on conventional capabilities to support its deterrence goals. It should be noted, however, that in those cases wherein conventional forces are adequate for the immediate deterrence task, U.S. nuclear capabilities may remain critical to deter a nuclear-armed opponent (or an opponent armed with chemical or biological weapons) from escalating to WMD use as the means of overcoming U.S. conventional threats. Relying on U.S. conventional threats for deterrence may have the unintended consequence of leading opponents to plan increasingly on employing WMD capabilities as the most likely means of overcoming U.S. conventional-based deterrence strategies. Russia certainly appears to have moved in that doctrinal direction. Consequently, even in those cases where U.S. conventional forces are deemed adequate for immediate deterrence purposes, U.S. nuclear deterrent capabilities may be critical to control an opponent's escalation to WMD use as the means to trump U.S. conventional capabilities.

Key U.S. allies expect and rely on the United States to provide the combination of deterrent threats necessary to preserve their security. This includes the full spectrum of U.S. capabilities. This approach can be clearly seen in the most recent open NATO strategy document, which by consensus calls for a combination of nuclear and conventional capabilities for deterrence.

Mr. GARAMENDI. Current policy states that the United States will respond in exceptional circumstances to non-nuclear attacks with nuclear weapons. Should the United States adopt a "no first use" policy, which would deemphasize the role that nuclear weapons play in our overall strategic posture? Would it help or hurt our interactions with other nuclear weapons states?

Dr. PAYNE. The United States should not adopt a "no first use" declaratory policy. Doing so would contribute to opponents' possible perceptions, encouraged by such a U.S. policy declaration, that they could use chemical or biological weapons against the United States and allies without fear of the U.S. nuclear deterrent. Given public reports that some prospective foes retain chemical and/or biological weapons (CBW), effectively undermining the U.S. nuclear deterrent of opponents' CBW would be imprudent in the extreme. Indeed, it should be noted that U.S. leaders stated openly in the past that the United States was able to go forward with the international conventions against CBW specifically because the United States would retain nuclear weapons to deter CBW threats. A "no first use" policy would destroy that logic.

Adopting a "no first use" policy also would undermine U.S. assurance goals for many key allies who rightly consider themselves vulnerable to their opponents' conventionally superior forces. Such a U.S. declaratory policy would essentially tell opponents that the U.S. nuclear deterrent does not apply to their prospective use of overwhelming conventional force against our allies, or their use of CBW against our allies. That is why I consider a "no first use" policy to be highly destabilizing in

some cases, and also why many of our allies have warned against U.S. adoption of such a policy. I should add that there is no evidence whatsoever that a U.S. “no first use” policy would promote good will and benign behavior by opponents that might mitigate these problems.

Mr. GARAMENDI. What importance do our NATO allies place in the presence of forward-deployed nuclear weapons in Europe? Would they be satisfied with the nuclear force structure we currently offer our Asian allies?

Dr. PAYNE. NATO allies are somewhat divided in opinion regarding the value of U.S. forward-based nuclear systems (FBS)—with the division generally following understandable geographical lines. In particular, those NATO members that neighbor Russia and were former members of the Warsaw Pact, and those NATO members that were located within the Cold War borders of the Soviet Union, appear to place great significance on the deterrence and assurance value of U.S. FBS. In fact, these countries have recently been the target of numerous nuclear threats from Russian leaders. There is considerable evidence from open leadership comments in these cases that these NATO members do not believe that they can be assured adequately by U.S. central strategic nuclear systems alone. It should be noted that there also appears to be increasing concern shown by Asian allies, particularly including South Korea, about U.S. reliance on central strategic nuclear systems alone for deterrence and their assurance. Public opinion polling in South Korea, for example, has revealed considerable popular support for the return of U.S. nuclear forces to South Korea.

Mr. GARAMENDI. How would you recommend the United States structure our forces to respond to Russia’s nuclear deescalation policy? How could the United States respond without developing new tactical nuclear capabilities?

Dr. PAYNE. The Russian nuclear “de-escalation” strategy is, in reality, a nuclear first-use strategy. And, as discussed in Questions 7 and 9 above, the premise underlying this strategy is that Russia could threaten to employ, or in fact employ nuclear weapons in a limited, discriminate fashion without triggering a U.S. strategic nuclear response. The U.S. would, in effect, be expected to be deterred from responding in a forceful way to a severe Russian regional provocation, and would, instead, concede to Russian limited nuclear threats or limited nuclear use for fear of further Russian nuclear escalation. If so, U.S. and NATO deterrence strategies would have failed. U.S. leaders may find this an unreasonable expectation on the part of Moscow, but Russian leaders appear increasingly confident and have openly applied this strategy to its military occupation of Crimea.

I believe that there are two main requirements to address this dangerous and destabilizing Russian nuclear first-use strategy. First, NATO and U.S. conventional capabilities need to be sufficiently robust in front-line areas to deny Russia the possibility of presenting the U.S. and NATO with a fait accompli following a rapid advance into NATO or other neighboring territories. In effect, NATO needs to counter President Putin’s claim that Russian troops could be in five NATO capitals within two days.

Second, U.S. and NATO nuclear capabilities need to be able to deny Moscow any confidence that the United States would have so few local nuclear options that limited Russian nuclear employment would essentially be followed by U.S. and NATO conciliation. Sustaining U.S. FBS and flexible nuclear threat options would likely be an important contribution to this goal: Western reliance on central strategic nuclear systems and conventional forces for deterrence in the region could simply confirm the apparent Russian expectation that its nuclear threats or employment would defeat a Western conventional defense and operate below the Western strategic nuclear deterrence threshold. I have not concluded at this point that “new” Western tactical nuclear weapons are necessary for this purpose. Matching the B-61 modernization program with forward-deployment of the F-35 may provide much of the needed flexibility and deterrent effect. There are other potential deployment options for a nuclear-capable F-35 that also could help address this problem without developing new U.S. tactical capabilities, as could adapting a number of U.S. missile warheads for a highly-discriminate, low-yield option.

Mr. GARAMENDI. Your plans all assume constant funding of 4–5% of the defense budget over the next 30 years. Uncertain fiscal times beg the question: what would you do with less? How would your plans change with 10%, 30%, or 50% less funding? Asked another way, what is the least important part of your nuclear posture?

Mr. COLBY. The amount of spending allocated to nuclear forces and their associated capabilities, such as command and control, represent a relatively modest proportion of total national spending on defense—generally considered to be around five

percent or less of the defense budget over the coming decades.¹⁰ Given the cornerstone importance of U.S. nuclear forces for our security and that of our allies, this is a very reasonable amount to spend on their modernization and maintenance.

For this reason, should the defense budget decline or other needs become more pressing, I would recommend protecting expenditures on nuclear forces and sacrificing investments in other areas of our military that serve more discretionary or elective rather than essential interests. That is, in such circumstances, we should not make a “haircut” across the defense budget. Rather, we should prioritize maintaining spending on those forces that are most important to our fundamental interests, such as nuclear forces, long-range strike and surveillance, and counter-terrorism capabilities, and decrease expenditures on less vital capabilities such as those oriented to stabilization and counterinsurgency operations or that have limited value in a more contested anti-access/area denial environment.¹¹

If the defense budget were to decline to a point at which decisions about which elements of the nuclear forces were to be retained became necessary, I would recommend maintaining the Triad and existing warhead plans but reducing the total numbers procured and/or altering their deployment schedules to reduce costs. It is important to note, in this respect, that proposals to remove a leg of the Triad may not even end up saving significant sums of money.

Mr. GARAMENDI. What role do conventional strike capabilities play in U.S. deterrence and extended deterrence? What are our allies’ expectations about the weapons with which we will respond in the event that mutual defense is necessary?

Mr. COLBY. Conventional forces play an elemental role in our deterrence and extended deterrence strategies. Fundamentally, we reasonably seek to rely when possible and prudent on conventional forces to deter adversary attack and coercion against ourselves and our allies. We can do so both through the outright threat of defeat—so-called deterrence by denial—as well as the threat of punishment through the use of conventional forces—so-called deterrence by cost-imposition. Using conventional forces for these functions is, of course, preferable because one of the most compelling ways to try to keep a conflict from escalating to the nuclear level is by refraining from using our own nuclear weapons.¹²

This effort to rely on conventional forces for deterrence and defense is well-understood and a long-term aspiration of U.S. policy. Paul Nitze remarked during the INF hearings in 1988 that the first conversation he heard in government about replacing some degree of U.S. reliance on its nuclear arsenal with augmented conventional forces took place in 1949.¹³

The issue today is not that conventional forces’ role is underestimated in U.S. defense posture, planning, and policy—but rather that nuclear forces’ role is. Indeed, not a few prominent policy leaders and government officials openly or privately express the view that the United States should not respond to adversary nuclear use with a nuclear strike of its own—let alone in the face of large-scale conventional attack that the United States and its allies cannot successfully repel.

It is for this reason that a significant number of U.S. allies—particularly those that feel imperiled—privately and sometimes publicly plead or insist that the United States make clearer that it would use nuclear weapons if these allies were sufficiently attacked—and not only in cases of nuclear attack. It is well known, for instance, that Japan and South Korea strongly opposed efforts within the Obama Administration for the United States to adopt a “no first use” posture.¹⁴ Similar views are common elsewhere in the Asia-Pacific as well as in Eastern Europe and other parts of the NATO Alliance more concerned about the threat from Russia.

It should be noted that, as in our own system, there are often differing views within allied governments and publics on extended nuclear deterrence and the con-

¹⁰ See Harrison and Montgomery, “The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond?” 33.

¹¹ For a similar view, see Andrew Krepinevich, “Strategy in a Time of Austerity,” *Foreign Affairs* (November/December 2012), 58–69.

¹² It is important to note that conventional forces can prompt nuclear use, however, particularly if they are used to pursue “total” objectives such as regime change or territorial conquest. Conventional-only strategies therefore, unless appropriately limited, can also drive nuclear use.

¹³ As Nitze put it: “We have been working hard for a long period of time, for many, many years, to get closer balance in the conventional field. In fact, that goes back all the way to my personal experience in 1949, when we began this effort to improve the conventional balance and reduce our reliance upon nuclear weapons. We tried and tried and tried.” Testimony of Paul H. Nitze to the Senate Committee on Foreign Relations, January 28, 1988, available in *The INF Treaty: Hearings Before the Committee on Foreign Relations of the United States Senate*. (Washington, D.C.: Government Printing Office), 311.

¹⁴ See, inter alia, “Japan Balks at Limits on U.S. Nukes,” *The Japan Times*, September 15, 2009 and George Perkovich, *Do Unto Others: Toward a Defensible Nuclear Doctrine* (Washington, DC: Carnegie Endowment for International Peace, 2013), 2 and 21.

ditions under which the United States should use nuclear weapons. Generally speaking, ministries of defense and security-conscious political leaderships tend to be more concerned about maintaining the salience of nuclear weapons in U.S. extended deterrence, while ministries of foreign affairs (especially disarmament bureaus) and disarmament-focused political leaderships tend to be more focused on minimizing their role.

Mr. GARAMENDI. Current policy states that the United States will respond in exceptional circumstances to non-nuclear attacks with nuclear weapons. Should the United States adopt a “no first use” policy, which would deemphasize the role that nuclear weapons play in our overall strategic posture? Would it help or hurt our interactions with other nuclear weapons states?

Mr. COLBY. The United States should not adopt a “no first use” policy regarding nuclear weapons. Such a posture would be ill-advised for several reasons, especially in an era when our conventional military advantages are being challenged and in many respects are eroding.

First, the United States benefits from the deterrent power of the possibility that it may use nuclear weapons in extreme circumstances not involving nuclear attack. Potential adversaries must calculate that the United States might well use nuclear weapons even if they find ways to do great damage to us, our allies, or our interests without resorting to nuclear weapons themselves. This means that adversaries can never hope to “outwit” U.S. nuclear deterrence and therefore adds to their caution in challenging the important interests of the United States. It is largely for this reason that many U.S. allies, particularly those that feel more threatened, tend strongly to oppose U.S. adoption of a “no first use” pledge.

Second, the benefits of a “no first use” policy are not outweighed by its costs and risks. It is true that such a policy can strengthen an adversary’s confidence that a war with the United States that it agrees to keep conventional is unlikely to go nuclear. This can reduce “use or lose” and instability pressures in the midst of a war. Yet this is not a dramatically different perception than is currently the case: the United States consistently gives the impression that it will only use nuclear weapons under “extreme circumstances” and has never employed them since 1945 despite being involved in several major conflicts. Adversaries very likely understand that the United States will only seriously consider employing nuclear weapons under such “extreme” conditions.

There is a deeper problem with such a pledge, however. A “no first use” pledge can never be verified or enforced. Any state pledging a “no first use” policy—including the United States—can, therefore, always change its mind and renege on such a promise in the midst of a conflict.¹⁵ This means that an adversary, knowing this, may simply discount the value and scope of the “no first use” policy, in which case serious questions arise about the purpose and significance of the policy. What is the point of such a policy if an adversary acts as if it is irrelevant?

Or, worse, an adversary may actually believe the policy and judge it sufficiently necessary or attractive in the midst of a war to take steps that compromise the most important interests of the United States or its allies without resorting to nuclear weapons. In such an eventuality, the United States will likely be pressed—including by its allies whose vital interests are the most likely to be at stake—to use nuclear weapons. In other words, an opponent that actually takes such a pledge at face value may be incentivized to create the very conditions that would provoke nuclear weapons use by the United States.

Thus a “no first use” policy is likely either to be, at best, of marginal value or, at worst, to encourage the very conditions likely to prompt U.S. nuclear weapons employment. Accordingly, the United States should instead maintain ambiguity about the conditions under which it would use nuclear weapons, but emphasize that such a step would only be considered under “extreme circumstances” that impinge on the vital interests of itself or its allies. Thus U.S. adversaries and allies alike will continue to understand that the United States would only employ such terrible weapons under the most severe challenge, but that an adversary can never hope to “end run” U.S. restraint with respect to its nuclear forces to take advantage of the United States or its allies.

Mr. GARAMENDI. What importance do our NATO allies place in the presence of forward-deployed nuclear weapons in Europe? Would they be satisfied with the nuclear force structure we currently offer our Asian allies?

¹⁵The United States quickly abandoned its nearly two centuries-old insistence on the protection of neutral shipping at the beginning of World War II in favor of pursuit of unrestricted submarine warfare. See, for instance, Joel Ira Holwitt, *“Execute against Japan”: The U.S. Decision to Conduct Unrestricted Submarine Warfare* (College Station, TX: Texas A&M University Press, 2013).

Mr. COLBY. Given the size of and the diversity of perspectives among member-states within the Atlantic Alliance, there is substantial variation within NATO regarding the value of U.S. nuclear weapons forward-deployed in Europe. On the whole, member-states farther to the east that perceive themselves as more under threat, particularly from Russia, tend to place greater value on these weapons than those farther west. Moreover, there tends to be a divide within European governments and populaces, with ministries of defense and security-conscious political leaderships emphasizing the importance of such weapons, and ministries of foreign affairs (especially their disarmament bureaus) and disarmament-minded political leaderships underlining their demerits. This disagreement resulted in the somewhat mixed message about these weapons reflected in the 2012 NATO Deterrence and Defense Posture Review, which affirmed that NATO is “a nuclear alliance” but referred to the forward-deployed non-strategic nuclear weapons only in the context of expressing a willingness to reduce them in the context of mutual reductions with Russia.¹⁶

On the whole, however, it is worth observing that member-states have agreed that U.S. nuclear weapons should continue to be forward-deployed in Europe, testifying to their value. Moreover, calls for withdrawing these weapons have quieted and have fallen in credibility in light of Russia’s threatening behavior and rhetoric since early 2014.

U.S. allies that perceive themselves as threatened by Russia have made it clear that they would not judge a force posture that the United States has pursued in Asia as attractive. While much of the value of U.S. forward-deployed weapons is symbolic, this symbolism is nonetheless important as it gives concrete evidence of the nuclear link between the United States and NATO/Europe and demonstrates the collective involvement of the Alliance member-states in the nuclear mission. Indeed, in point of fact, key U.S. allies in Asia, particularly in South Korea and Japan, are increasingly questioning the suitability of the U.S. model of extended nuclear deterrence in their region.

Mr. GARAMENDI. How would you recommend the United States structure our forces to respond to Russia’s nuclear deescalation policy? How could the United States respond without developing new tactical nuclear capabilities?

Mr. COLBY. While I strongly recommend that the United States modernize and adapt its nuclear forces to enable discriminate and relatively controlled employment, this is by no means the only important step needed to deal with Russia’s de-escalation and broader military strategy. The nuclear element is the coup de grace of Moscow’s strategy—but it only makes sense if Russia can use it to terminate a conflict to reap gains. To do this, Moscow needs conventional and irregular forces able to gain positions which can then be locked in through a nuclear “escalate to deescalate” strategy.

To deal with this problem, the United States and NATO as a whole should focus on substantially strengthening their conventional military posture in Eastern Europe, including by forward-deploying more substantial forces in the Baltic States and Poland, strengthening Allied forces’ ability to more effectively contest Russian anti-access/area denial capabilities, and enabling U.S. surge and reinforcement forces.¹⁷ It is worth emphasizing that at least some of these recommended steps, particularly the substantial reinforcement of the Baltic states, could be coupled with arms control proposals to Moscow.¹⁸ At the same time, eastern NATO member-states should focus on strengthening civil order capabilities to make it more difficult for Russia to create or exploit local conditions through the use of “little green men,” disinformation, and the like.

Together, a discriminate nuclear posture, a more formidable conventional deterrent, and improved civil capabilities will present Moscow with a less inviting target than is the case today, and will accordingly make NATO safer.

Mr. GARAMENDI. Your plans all assume constant funding of 4–5% of the defense budget over the next 30 years. Uncertain fiscal times beg the question: what would you do with less? How would your plans change with 10%, 30%, or 50% less funding? Asked another way, what is the least important part of your nuclear posture?

Dr. BLECHMAN. The minimal deterrent that I advocate would not require more than 3 percent of the defense budget. By reducing the submarine buy to 8 or 10

¹⁶ NATO, *Deterrence and Defence Posture Review* (May 20, 2012).

¹⁷ For further development of these recommendations and the underlying problems they seek to address, see Colby and Solomon, “Facing Russia: Conventional Defence and Deterrence in Europe.”

¹⁸ For further development of this proposal, see Elbridge Colby, “Step Up to Stand Down: The United States, NATO, and Dissuading Russian Aggression,” *Foreign Affairs*, August 13, 2015, <https://www.foreignaffairs.com/articles/poland/2015-08-13/step-stand-down>.

boats, reducing the ICBM force from 400 to 300 missiles, making the minor improvements necessary to keep Minuteman effective into the 2040s, rather than replacing it with a new missile, withdrawing the tactical weapons from Europe and dismantling them, and cutting back current plans to modernize the nuclear infrastructure, I believe we can save a considerable amount of money that could be used to maintain the readiness and effectiveness of our conventional forces, and to invest in advanced technologies that can assure our continued conventional superiority.

Mr. GARAMENDI. What role do conventional strike capabilities play in U.S. deterrence and extended deterrence? What are our allies' expectations about the weapons with which we will respond in the event that mutual defense is necessary?

Dr. BLECHMAN. U.S. conventional strike capabilities are the central element in both our deterrent posture and in our capabilities to protect our allies from attacks—both in their perceptions and in fact. Although the allies see U.S. strategic nuclear forces as essential to deter nuclear attacks, they understand the primary threats to their security will come from conventional forces and the ability of their armed forces, combined with those of the U.S., to respond effectively to any such attack dissuades potential adversaries from even contemplating such actions.

Mr. GARAMENDI. Current policy states that the United States will respond in exceptional circumstances to non-nuclear attacks with nuclear weapons. Should the United States adopt a “no first use” policy, which would deemphasize the role that nuclear weapons play in our overall strategic posture? Would it help or hurt our interactions with other nuclear weapons states?

Dr. BLECHMAN. Personally, I don't believe that doctrinal statements are nearly as important as the actual capabilities and behavior of nations. Nonetheless, I believe the U.S. should adopt a policy that states that the only role of our nuclear weapons is to deter and, if necessary, to respond to a nuclear attack on ourselves or our allies. I believe this would strengthen our hand non-nuclear states and the Non-proliferation Treaty and would have no real effect on relations with nuclear weapon states.

Mr. GARAMENDI. What importance do our NATO allies place in the presence of forward-deployed nuclear weapons in Europe? Would they be satisfied with the nuclear force structure we currently offer our Asian allies?

Dr. BLECHMAN. Prior to the Russian seizure of Crimea and intervention in Eastern Ukraine, many NATO allies were beginning to urge the removal of U.S. tactical nuclear weapons from Europe. Since then, however, and particularly in view of Russian threats and provocative military behavior in northern Europe, the members of NATO east of Germany, have put new emphasis on the need to maintain and even strengthen NATO's tactical nuclear posture. This is irrational in my view, as these weapons serve no military purpose, would be unlikely to be used in any conflict (as the host nations—Germany, Belgium, Netherlands, and Italy—would have to authorize their aircraft crews to deliver them), and their deterrent effect is negligible compared to that provided by U.S. strategic nuclear forces. Still, one should expect considerable attention to be paid to these weapons at the NATO meeting in Warsaw in May and steps taken to re-energize attention paid to exercises and planning for these weapons.

Mr. GARAMENDI. How would you recommend the United States structure our forces to respond to Russia's nuclear deescalation policy? How could the United States respond without developing new tactical nuclear capabilities?

Dr. BLECHMAN. The United States should make clear that any nuclear use—whatever the launching vehicle, range of the weapon, or its yield—will be met with an at least comparable nuclear response from U.S. strategic (long-range) nuclear forces. There is no need, in my view, to match Russian tactical forces when our strategic capabilities are far greater than necessary to completely destroy Russia and thereby deter any nuclear attack. If desirable, during a crisis in Europe that seemed to be leading to a conflict, the U.S. could deploy nuclear capable of long-range bombers to bases in Europe to signal the Russians that we were prepared for such a conflict and that they should not consider any nuclear use.

Mr. GARAMENDI. Former Secretary of Defense Perry and former Assistant Secretary of Defense Andrew Weber recently wrote an op-ed calling on the president to cancel the planned acquisition of the Long-Range Standoff weapon, because it would be destabilizing. Do you believe this weapon is needed? Why or why not?

Dr. BLECHMAN. I believe the U.S. should give a high priority to developing and rapidly producing the new long-range stealthy, penetrating bomber. This alone should ensure the ability of the bomber leg of the triad to carry out its mission for years to come. Although I don't see why developing the LRSO would be “destabilizing,” I simply do not see a need for it at present. Moreover, given the huge cost of the nuclear modernization program already underway, the LRSO is an unaffordable luxury. I would keep this program in a very small research program

until such time, if ever, the DOD determines that even the new bomber is unable to penetrate Russian air defenses. If that is the case already, then we should not be developing a penetrating bomber.

Mr. GARAMENDI. Would you favor continuing to press for potential nuclear weapons reductions negotiations with Russia, even though Russia is not in compliance with its INF Treaty obligations? Why or why not?

Dr. BLECHMAN. I would continue to press Russia to comply with the INF Treaty by not conducting any further tests of the missile that apparently violated its term and, particularly, by not deploying any of those missiles. If the Russians do not violate the treaty again, I would press for renewed negotiations to reduce nuclear arms—to cover both long-range and shorter range weapons. We lived for many years with a clear Russian violation of the ABM Treaty and still continued to negotiate with them to reduce nuclear forces, to both sides benefit.

Mr. GARAMENDI. Your plans all assume constant funding of 4–5% of the defense budget over the next 30 years. Uncertain fiscal times beg the question: what would you do with less? How would your plans change with 10%, 30%, or 50% less funding? Asked another way, what is the least important part of your nuclear posture?

Dr. MOUNT. That funding for the current nuclear modernization program will be cut from its requested levels approaches a certainty. The overwhelming trend in Major Defense Acquisition Programs over the last several decades is that the military services do not receive appropriations to fund the requested number of units. Such was the fate of the Zumwalt destroyer, the Comanche helicopter, the B–2 stealth bomber, the Seawolf attack submarine, and several other programs. In all likelihood, this pattern will repeat itself in the Ohio Replacement Program, the Long Range Strike Bomber, and for other Air Force procurement programs. To expect otherwise in a period of intense fiscal pressure is simply unrealistic. As a result, the United States should accept that the current modernization plans are unsustainable and pare them back. Only prudent cuts that are planned in advance can ensure that U.S. Strategic Command can plan and execute a rational strategy for nuclear deterrence. If the United States does not review and limit current plans at an early date, it is likely that the services will be forced to hurriedly modify nuclear targeting plans and operational concepts in order to keep up with cuts imposed by the U.S. Congress. In short, nuclear strategy would be heavily influenced by whichever program happens to face cost overruns, a circumstance which is certainly not in the national interest.

Mr. GARAMENDI. Dr. Mount, I fear that future U.S. nuclear posture, especially with the recommendations in this report that the U.S. develop new tactical nuclear capabilities, rather than deter the small number of states who fear U.S. conventional dominance will instead push a much larger number of states to seek nuclear weapons which they see as militarily useful. Can you speak about the current state of the Nuclear Non-Proliferation Treaty and what the strategic environment might look like if current non-weapons states begin to withdraw from the NPT, due in part to a perceived non-commitment to disarmament?

Dr. MOUNT. I share your concern. The Nuclear Nonproliferation Treaty (NPT) stands at a critical and precarious juncture. A number of countries—many of which are allies—are seriously concerned that the United States is not living up to its commitment under Article VI of the treaty to make concerted progress toward a world without nuclear weapons. Whether or not one believes that this goal is useful or viable in the foreseeable future, the centrality of the Nonproliferation Treaty to the stability of the international system requires that the United States makes credible efforts in this direction. There are a number of steps that the United States can take in this regard without dropping below the aggregate strategic warhead limits of the New START treaty. For example, the national laboratories could renovate facilities to meet Safeguards By Design (SBD) standards and construct new facilities in a way that facilitates international inspection. The Departments of Energy, Defense, and State can compile datasets on nuclear materials and weapons and lodge this data in encrypted form with the IAEA or with allies or can selectively release this data publicly. And the Department of Defense can limit the numbers and types of dual-capable weapons systems. In these ways, the United States can show that it is working towards a verifiable nuclear disarmament treaty without dismantling warheads. In addition, the United States can and should continue to press Russia to make further verifiable reductions in both countries' stockpiles. The international movement on the humanitarian consequences of nuclear weapons has garnered global interest in a ban on nuclear weapons. If successful, a ban treaty might well undermine the Nonproliferation Treaty, as many countries would come to see a ban as an alternative forum for governing the nuclear world. At worst, this could precipitate the withdrawal of countries from the NPT, who believe that the nuclear weapons states' (NWS) abrogation of their commitments to disarm thereby relieves

non-nuclear weapons states (NNWS) of their obligations not to proliferate. If this came to pass, it would seriously damage the longstanding U.S. effort to prevent the spread of nuclear weapons.

Mr. GARAMENDI. What role do conventional strike capabilities play in U.S. deterrence and extended deterrence? What are our allies' expectations about the weapons with which we will respond in the event that mutual defense is necessary?

Dr. MOUNT. Nuclear weapons are poor instruments for defense. In the event a U.S. ally faces subconventional efforts to destabilize their government or an invasion from regular forces, the United States and the ally would hope and expect to resist that invasion with conventional forces. At the nuclear level, we would face a choice between employing a nuclear weapon against enemy troops on allied territory (which would likely cause widespread casualties of allied civilians) or to engage in a countervalue strike against the enemy homeland (which would expand the geographic scope of the engagement, thereby increasing the risk to neighboring states and to the U.S. homeland). As a result, U.S. allies have a right to expect and a responsibility to assist the United States in planning and prepositioning forces for a conventional defense of their territory. Though this might incur serious human and financial costs, these almost certainly pale in comparison to the increased risk of nuclear exchange if we succumb to the idea that reliance on nuclear weapons is necessary and sufficient to defend our allies.

Mr. GARAMENDI. Current policy states that the United States will respond in exceptional circumstances to non-nuclear attacks with nuclear weapons. Should the United States adopt a "no first use" policy, which would deemphasize the role that nuclear weapons play in our overall strategic posture? Would it help or hurt our interactions with other nuclear weapons states?

Dr. MOUNT. I believe the United States could safely adopt a "no first use" policy without deleteriously affecting our ability to maintain deterrence. The only circumstances in which the United States would contemplate the first use of nuclear weapons are if a close ally faced an existential threat that could not be halted with conventional means. Given the military capabilities of the U.S. and its allies, this possibility is remote. If faced with an invasion, nuclear first use would be a desperate gambit with little hope that it could preserve the territorial integrity of an ally at acceptable cost. Neither a strike on allied territory nor one on enemy territory would be likely to compel an aggressor to cease an ongoing military option that stood a good chance of succeeding. The doubtful success of such a strike makes its execution less likely, which in turn decreases its deterrent utility. By issuing a commitment to abstain from first use of nuclear weapons, the United States would modestly stabilize any militarized dispute with a regional nuclear power and lower the risk of nuclear war. If necessary, a "no first use" policy could be revised later as conditions require.

Mr. GARAMENDI. What importance do our NATO allies place in the presence of forward-deployed nuclear weapons in Europe? Would they be satisfied with the nuclear force structure we currently offer our Asian allies?

Dr. MOUNT. According to consistent reports in the unclassified press, the United States currently deploys about 180 B61 gravity bombs at a handful of bases located in select NATO countries. These forces reportedly operate a very low level of readiness and would take several weeks to activate, arm, and deploy. In any event, it is doubtful that a U.S. president would choose provide release authorization to an allied pilot in a tactical aircraft when several more prompt and survivable options exist in the U.S. force. If the weapons are not likely to be used, their power to assure allies and deter adversaries is correspondingly diminished. Moreover, Washington observers often overlook the differences of opinion within NATO regarding the presence of U.S. nuclear weapons in Europe. A number of U.S. allies have voiced skepticism about the NATO nuclear mission and have suggested that the weapons be removed. As a result, the presence of U.S. nuclear weapons is a low-level but unnecessary irritant to the alliance. As NATO states agreed in the Wales Summit Declaration of September, 2014, "The strategic nuclear forces of the Alliance, particularly those of the United States, are the supreme guarantee of the security of the Allies" (as opposed to nonstrategic nuclear forces). The weapons are a relic of the Cold War, when the United States faced an imminent threat of invasion by a numerically superior Soviet force. Today, the weapons serve little purpose. The 180 weapons could be removed without deleterious effect to the U.S. deterrent posture or to allied cohesion. As a result, the B61 Life Extension Program and the program to create nuclear-capable variant of the F-35 Lightning II are simply not worth the expense, which could better be directed to ensuring that the services can adequately fund programs that are critical to deterrence operations.

Mr. GARAMENDI. How would you recommend the United States structure our forces to respond to Russia's nuclear deescalation policy? How could the United States respond without developing new tactical nuclear capabilities?

Dr. MOUNT. Russia's policy of nuclear "deescalation" is intended as a means of offsetting American conventional superiority. By issuing incredible nuclear threats, Russia's leadership hopes to deter the United States from bringing the superior power of its armed forces to bear. Developing, deploying, or using tactical nuclear capabilities would only prove to Russia that it could successfully shift the strategic competition onto more advantageous grounds, and encourage it to behave more recklessly at the nuclear level. The United States should disabuse Russia of the notion that its irresponsible rhetoric can alter our resolve to defend our allies with conventional power and reverse any gains that Russia hopes to secure. With the time, attention, and resources it would take to build new nuclear capabilities, the United States and its allies should rededicate themselves to improving conventional deterrence. U.S. officials should consistently maintain that the use of nuclear weapons can never be deescalatory and reiterate the commitment to defend the territorial integrity of our allies in any eventuality.

Mr. GARAMENDI. Former Secretary of Defense Perry and former Assistant Secretary of Defense Andrew Weber recently wrote an op-ed calling on the president to cancel the planned acquisition of the Long-Range Standoff weapon, because it would be destabilizing. Do you believe this weapon is needed? Why or why not?

Dr. MOUNT. I do not believe the Long-Range Standoff weapon is a necessary system for the maintenance of nuclear deterrence or for the assurance of our allies. It will be a major challenge to fund nuclear modernization. To protect core systems, we should minimize expenses on extraneous ones. By the time the LRSO is ready to come online, we should already have a next-generation penetrating bomber that can deliver similar yields from locations in theater. Additionally, the Joint Air-to-Surface Standoff Missile-Extended Range (JASSM-ER) recently entered service and is sufficient to hold most targets at risk; those targets that require a nuclear yield are held at risk with ballistic nuclear missiles, launched from land or from sea. Furthermore, information released to the public suggests that the program runs the risk of violating a longstanding pledge of presidents from both parties not to procure new nuclear capabilities. To the extent that the LRSO improves upon the ALCM's range, stealth, and accuracy, it would reverse this policy. This, in turn, would cause tension with certain allies and further damage to the nonproliferation regime. In short, the system is simply not required and not worth the diplomatic or fiscal costs of developing it. We should retain the option to procure the system in the future but cancel the current program. Making these kinds of difficult decisions is necessary to keep from falling into a new nuclear arms race.

Mr. GARAMENDI. Would you favor continuing to press for potential nuclear weapons reductions negotiations with Russia, even though Russia is not in compliance with its INF Treaty obligations? Why or why not?

Dr. MOUNT. Yes. The Russian violation of the Intermediate Nuclear Forces Treaty is a serious challenge to the arms control regime. It should make us highly skeptical of Russia's ability to negotiate in good faith on arms control. The United States should undertake a whole-of-government approach to ensure that Russia does not realize strategic gains from its violation. However, Russia is rigorously and consistently abiding by the terms of the New START agreement. Recently, the two sides exchanged their 10,000th notification as required under the terms of the treaty. These notifications are a major source of information on the Russian nuclear arsenal and help to stabilize the relationship even when other lines of communication are endangered by poor relations. Furthermore, the United States retains very real concerns over the size and structure of the Russian nuclear arsenal. An agreement that limits the number and variety of Russia's tactical nuclear systems or places greater constraints on deployed strategic systems could very well be in the national interest. Though the Russians have so far refused the Obama administration's offers to negotiate along these lines, the offer should remain on the table. Throughout the Cold War, U.S. presidents of both parties continued to press the Soviet Union to engage in mutual verifiable arms reductions and these efforts helped to promote deterrence and stabilize an acrimonious relationship. As we move into a period of increased geopolitical competition, arms control becomes more important, not less. Arms control is not a reward for a stable world; it is a means of building one.