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U.S. NUCLEAR WEAPONS POLICY

HEARING

BEFORE THE

STRATEGIC FORCES SUBCOMMITTEE

OF THE

COMMITTEE ON ARMED SERVICES
HOUSE OF REPRESENTATIVES

ONE HUNDRED TENTH CONGRESS

FIRST SESSION

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U.S. NUCLEAR WEAPONS POLICY

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U.S. NUCLEAR WEAPONS POLICY

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ARMED SERVICES,
STRATEGIC FORCES SUBCOMMITTEE,
Washington, DC, Wednesday, July 18, 2007.

The subcommittee met, pursuant to call, at 2:00 p.m. in room 2212, Rayburn House Office Building, Hon. Ellen O. Tauscher (chairman of the subcommittee) presiding.

OPENING STATEMENT OF HON. ELLEN O. TAUSCHER, A REPRESENTATIVE FROM CALIFORNIA, CHAIRMAN, STRATEGIC FORCES SUBCOMMITTEE

Ms. TAUSCHER. Good afternoon. This hearing of the Strategic Forces Subcommittee will come to order. The purpose of today's hearing is to examine the United States' nuclear weapons policy and discuss our options regarding the future size and composition of the U.S. nuclear weapons stockpile. Led by this subcommittee, the House Armed Services Committee has called for a vigorous and open debate on the future direction of the United States strategic posture and a fresh examination of our nuclear weapons policy in particular.

In the National Defense Authorization Act for Fiscal Year 2008, which was approved by the House on May 17th, we call for the establishment of a congressionally appointed, bipartisan commission to analyze and make recommendations on the United States' strategic posture. This commission is designed to both foster and frame the debate we believe is needed. We fully intend that Congress participate in this debate, and this hearing is part of that process.

So I am very delighted to welcome our distinguished panel of witnesses to the subcommittee today: Dr. William Perry, former Secretary of Defense and current co-director of the Preventive Defense Project at the Center for International Security Cooperation at Stanford University; Dr. Sidney Drell, professor and deputy director emeritus at the Stanford Linear Accelerator Center; and Dr. Keith Payne, a principal architect of the most recent Nuclear Posture Review (NPR) and current chair of the Department of Defense and Strategic Studies at Missouri State University.

I want to sincerely thank each of our witnesses for appearing before the subcommittee today. Each of you brings a wealth of experience and expertise to this subject, which could not be more important or more timely.

What the United States does with its nuclear weapons and how we do it is closely linked to our ability to dissuade other nations around the world from pursuing the deadliest of all weapons and our efforts to stem the proliferation of nuclear weapons technology.

We have no higher security imperative than that. To be sure, other nations will continue to make their own decisions about whether to pursue nuclear weapons for many reasons. But how we manage and maintain our nuclear arsenal directly impacts how credible we can be when pressing for global non-proliferation. And we have committed under Article VI of the Non-Proliferation Treaty (NPT) to work in good faith toward nuclear disarmament.

So how do we craft a nuclear weapons strategy that meets this challenge? The most recent Nuclear Posture Review is almost six years old. It calls for a new triad which promised to de-emphasize nuclear weapons, but that promise was undermined by its call for new types of nuclear weapons, and its endorsement of preemption raised more questions than it answered.

The Bush Administration has opposed arms control treaties, rejected the Comprehensive Test Ban Treaty (CTBT) and negotiated an open-ended Moscow Treaty which allows for reductions in deployed nuclear weapons, but it does not achieve those with any significant reductions.

In this context, we find ourselves at a critical juncture regarding our strategic posture. The human capital and the physical infrastructure we rely on to keep our nuclear weapons safe, secure and reliable is aging, and the Administration's nuclear weapons experts tell us that, in the coming years, the Life-Extension Programs (LEPs) currently used to maintain our legacy weapons will no longer be cost-effective.

The Bush Administration has offered two major proposals to address these emerging challenges. The first, the Reliable Replacement Warhead (RRW) Program is designed to modernize our weapons stockpile, and Complex 2030 is a modernization program designed to transform the nuclear weapons complex that supports that stockpile.

These far-reaching proposals represent the National Nuclear Security Administration's (NNSA) preferred future investment and policy strategy, but they also raise fundamental questions: How many nuclear weapons does the United States need to meet the President's test of "the smallest number consistent with the United States' national security interests"? What sort of weapons complex do we need to ensure the safety and reliability of these weapons? How large should our stock of reserve weapons be and how much would development of the RRW affect that answer? Is it possible to develop RRW without sending a signal to the rest of the world that we are investing in a new generation of nuclear weapons?

I have called for extending the Strategic Arms Reduction Treaty (START) and for negotiating a new legally binding agreement that achieves greater, verifiable reductions in the United States' and Russia's nuclear forces, measures that the Bush Administration has not endorsed.

In this spirit, as the Non-Proliferation Treaty is under assault, and as this Administration rejects the CTBT and does not negotiate a new Fissile Material Cutoff Treaty (FMCT), what is the role of arms control treaties in today's world, and how can they be made more effective?

This is not a rhetorical question. Iran is on course to develop a military nuclear capability. I believe a future step by Iran could be

to expel the International Atomic Energy Agency (IAEA) inspectors and withdraw from the Non-Proliferation Treaty. Instead of waiting for Iran to do this on its own terms, I believe we need to rally all of our allies around and strengthen the NPT and make it clear that we believe that there are explicit penalties for leaving the treaty.

Gentlemen, I would like your thoughts on this matter. Answering these questions is as critical to our national security as any issue before this committee or the Congress, and I look forward to a good discussion today.

Our Ranking Member, Mr. Everett of Alabama, is busy with a markup in another committee and cannot be here. I understand he has a statement that he would like to enter into the record, and without objection, it will be made part of the record.

[The prepared statement of Mr. Everett can be found in the Appendix on page 33.]

Now let me welcome my good friend and colleague, Mr. Thornberry of Texas, who will sit in for Mr. Everett for any comments that he may have.

Mr. Thornberry, you are recognized for five minutes.

STATEMENT OF HON. MAC THORNBERRY, A REPRESENTATIVE FROM TEXAS, STRATEGIC FORCES SUBCOMMITTEE

Mr. THORNBERRY. Thank you, Madam Chairman, and I appreciate you making Mr. Everett's statement part of the record. I also appreciate this hearing and the questions that you pose.

I think it is true, as all the witnesses agree, that a lot has changed in the world and in our security environment since our current nuclear stockpile was conceived and deployed. I think it may also be true that we have gotten to the point where we may take our nuclear weapons for granted, or maybe to put it better, we take the nuclear deterrence that comes from our current stockpile somewhat for granted. In fact, I think it is a little bit hard for us to think about what the world would be like if we did not have the American nuclear deterrent. Would other countries who rely on our nuclear deterrent be more inclined to have nuclear weapons of their own? Would others be more adventurous, or would peace and harmony break out everywhere if the American nuclear stockpile were not credible?

I think these witnesses, and there are others that I think have interesting opinions that we ought to consider, but I think it is very important for this subcommittee and for Congress to ask and listen to answers of questions like you have posed.

For example, what is the role of nuclear deterrence in today's world and in the future? And second, what sort of characteristics would fulfill that role? I think sometimes we get locked into the characteristics of the Cold War stockpile without thinking more broadly what sort of characteristics make the most sense for our security? And then you do have to go to questions like, can you achieve those characteristics without testing? How would they be deployed? What sort of complex do you need to produce those sorts of weapons? All good questions. And I would add another: What happens if we are wrong in our assumptions?

Madam Chair, we may have some differences on this committee about how much of our security we are willing to stake on pieces of parchment, but I think there is no doubt that it is our obligation to ask these clear questions of nuclear deterrence and where they fit into the broader security interests of the United States.

So I want to join you in welcoming, I think, all of these witnesses back, for those of us who have been here a few years, and look forward to their testimony.

Ms. TAUSCHER. I thank Mr. Thornberry for his comments. We would like to make it clear that each of our guests today, witnesses today have submitted for the record extensive statements, and if you gentlemen could each summarize to the extent, five, seven minutes, that would be great, because I think what we really are looking for is for the opportunity for members to engage you in questions.

So with unanimous consent, we will put your statements in the record. And if we could begin with Dr. Perry.

Welcome again, Dr. Perry.

STATEMENT OF DR. WILLIAM J. PERRY, CO-DIRECTOR, PREVENTIVE DEFENSE PROJECT, CENTER FOR INTERNATIONAL SECURITY COOPERATION, STANFORD UNIVERSITY

Dr. PERRY. Thank you very much, Madam Chairman.

Our government probably today is focused on Iraq for quite understandable reasons. But I believe the greatest danger our Nation faces is that a terror group will detonate a nuclear bomb in one of our cities. This would be the worse catastrophe of our time. Just one primitive nuclear bomb based on the design of the Hiroshima bomb could result in more than a 100,000 deaths, and there could be more than one bomb. The direct economic losses from the detonation would be hundreds of billions of dollars, but the indirect economic impact would be even greater as worldwide financial markets collapse in a way that would make the market setback after 9/11 seem mild. The social and political effects are incalculable, especially if the nuclear bomb were to be detonated in Washington, disabling a significant part of our government.

So almost 20 years after the ending of the Cold War, we still have a dark nuclear cloud hanging over our heads. As the Cold War was coming to an end, the Presidents of the United States and the Soviet Union, President Reagan and President Gorbachev, confronted this danger to civilization and sought to end it. They met in 1986 at Reykjavik and engaged in serious discussions on how to end the danger by bringing about an elimination of nuclear weapons. In the end, the two Presidents were not able to reach agreement on the major steps they were discussing, and the Reykjavik meeting is considered by many to have been a failure.

Last September, on the 20th anniversary of the Reykjavik summit, George Shultz hosted a conference at Stanford to see what lessons we could learn from that remarkable meeting where Presidents Reagan and Gorbachev seriously discussed eliminating not only nuclear weapons, but also their delivery means. At our Stanford meeting, at which both Dr. Drell and I participated, we concluded that the nuclear vision pursued by Reagan and Gorbachev at Reykjavik was valid and should be revived.

We put together the main ideas that came out of that meeting in an op-ed published by *The Wall Street Journal*. This op-ed was signed by George Shultz, Sam Nunn, Henry Kissinger and myself, all of whom played a major role in sustaining our nuclear programs during the Cold War. It was followed in a few days by another op-ed from President Gorbachev, who essentially endorsed the views we had expressed.

Of course, we understood that it might be many decades before that nuclear vision might be realized. And in the meantime, until nuclear weapons are eliminated, we should focus on steps to reduce their danger.

So we outlined in our op-ed a set of steps that could be taken now that would have the practical effect of greatly reducing that risk. In my written testimony, I listed those in summary steps. I call those to your attention.

I believe that our best hope of dealing with the danger of nuclear weapons lies in the policy for the United States that embraces the long-term vision, coupled with the short-term programs for systematically moving toward that vision.

The long-term vision could be a vision that inspired Reagan and Gorbachev at Reijkavik, and the short term could be the ones sketched out in our op-ed piece.

We will follow up this op-ed with another conference at Stanford in October where we work out the details of how to implement these short-term programs. But even before we undertake that task, it is clear that the programs now underway in the United States are inadequate to protect us from this evident danger.

The centerpiece of our Government's strategy for dealing with a nuclear attack is the National Missile Defense System now being installed in Alaska and being considered for deployment in central Europe. But terrorists would not use a ballistic missile to deliver their bomb; they would use a freighter or a truck.

So it seems all too clear that we cannot deal with the danger of nuclear terrorism either by defense or, for that matter, by deterrence, which is not likely to be effective against a terror organization like al Qaeda.

But there is some good news in this otherwise grim picture. No terror group is able to build a nuclear bomb from scratch; only a nation can manage a project of that complexity. For a terror group to get a nuclear bomb, they must buy or steal one from a nuclear power or, with more difficulty, put one together from the plutonium or highly enriched uranium that they acquire from a nuclear power. So the key to success is to keep them from getting the bomb or the fissile material in the first place.

The Proliferation Security Initiative (PSI) was established a few years ago as a cooperative international program to interdict nuclear weapons or material being illegally transferred. This is a useful program in many respects, but we should never—we should never believe it is likely to be successful in preventing a nuclear power from smuggling a bomb to a terror group. A so-called tactical bomb could be put in a suitcase. The plutonium needed to make a bomb as destructive as the Hiroshima bomb is about the size of a grapefruit. There is no interdiction system that exists or for that

matter that is conceivable that would have a good probability of stopping a clever smuggler from transferring either of these.

Our Government's near-term strategy should be focused on programs designed to accomplish two objectives: First, reducing and protecting existing nuclear arsenals; and, second, taking all feasible actions to keep new arsenals from being created. Both of these objectives require a concerted effort on the part of our Government, but neither can be fully successful without the cooperation of many other governments, most importantly, the cooperation of all of the other nuclear powers.

During my period as Secretary of Defense, I made reducing and protecting existing nuclear arsenals my top priority, using a program that had been inspired by two visionary Senators, Sam Nunn and Dick Lugar. Our greatest success with the Nunn-Lugar program was getting Ukraine, Kazakhstan and Belarus to give up all of their nuclear weapons. And at the time we started this program, Ukraine was the third largest nuclear power in the world, in fact, with more nuclear weapons than England, France and China combined.

At the same time we did this, we took actions in cooperation with the Russian Government to substantially improve the safeguards on nuclear weapons, material, and technology. I fully believe that it should be our top priority to strengthen the Nunn-Lugar program and extend it to include all nuclear powers, and to deal with fissile materials associated with commercial power reactors.

The second challenge is to keep new nuclear programs from being created. During the last six years, North Korea and Iran have substantially advanced their nuclear weapon programs, even though the Administration has stated that they considered such programs unacceptable.

Beyond North Korea and Iran, there are a dozen countries that have the capability to build nuclear weapons in a year or two. These nations have voluntarily joined the Nuclear Non-Proliferation Treaty and renounced the building of nuclear weapons.

But this Non-Proliferation Treaty is threatened today by the emergence of new nuclear powers, namely India and Pakistan, and would be entirely undermined if North Korea and Iran are free to build nuclear arsenals. But it also could be undermined by the two major nuclear powers, Russia and the United States. Russia has declared that, because of the weakness of its conventional military forces and because of the American deployment of the National Missile Defense System in Europe, it must depend more on nuclear weapons. They have renounced their previously stated no-first-use policy. They have re-MIRVed their old Intercontinental Ballistic Missiles (ICBMs); and they are undertaking the development of new ICBMS and maintain a large stock of tactical nuclear weapons.

The Bush Administration, for its parts, has requested congressional authority to develop new nuclear weapons, most notably the so-called Bunker Buster, and has requested the authority to build a Reliable Replacement Warhead.

Any attempt to prevent a hemorrhage of proliferation requires Russia and the United States to show leadership in complying with the requirement of the Non-Proliferation Treaty for the nuclear

powers to move toward nuclear disarmament. Our op-ed was written in that spirit.

One specific question faced by this committee is whether to authorize the Reliable Replacement Warhead program. There are two valid arguments for proceeding with that program: first, that it will maintain the capability of our nuclear weapon designers; and that it allows the design of a warhead that cannot be detonated by a terror group even if they were able to get one. A countervailing argument is that if the United States proceeds to develop new nuclear warheads, it will undermine our ability to lead the international community in the fight against proliferation.

My best subjective judgment at this time is that the proliferation argument outweighs the other two, but I understand we live in a dangerous and uncertain world, and I firmly believe that we have to maintain an unequivocal deterrent capability for the foreseeable future. So my judgment would be different if I thought that our present nuclear force could not be maintained to provide that capability for many decades in the future.

In sum, I believe that we could defer for a number of years the development of a Reliable Replacement Warhead. I have no doubt that this would put us in a stronger position to lead the international community in the continuing battle against nuclear proliferation, which is an eminent danger to all of us. Most importantly, I believe that our best protection against nuclear terrorism is robust programs that keep nuclear weapons and fissile material out of the hands of the terrorists.

Thank you, Madam Chairman.

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

Ms. TAUSCHER. Thank you, Dr. Perry.

Dr. Drell.

STATEMENT OF DR. SIDNEY D. DRELL, PROFESSOR EMERITUS, STANFORD LINEAR ACCELERATOR CENTER, STANFORD UNIVERSITY

Dr. DRELL. Thank you, Madam Chairman, for this opportunity to testify on this important subject.

The existing international regime, grounded in the Non-Proliferation Treaty for preventing the spread of nuclear weapons, is in serious danger. The inevitable spread of technology creates the danger of more states with nuclear arms and fissile material, which in turn provides more opportunities for theft or sale of this material into dangerous hands, thereby increasing the risk that nuclear weapons will be used.

Beyond North Korea and Iran, more than 40 nations have already taken substantial steps forward in nuclear technology. Even more have indicated interest in developing such technology for civilian power. And once you can enrich uranium for a civilian power reactor, you are well on your way to nuclear power.

If we continue the present course, the United States and the world will soon be compelled to enter a new nuclear era that will be more precarious and economically costly than was the Cold War deterrence. Those concerns provide the context for my views on the

policy and programs on strategic nuclear weapons that this country should follow, as well as on the RRW.

My longer statement on that is in the record. As well as I would like to submit an article that respectfully appeared on the subject in full detail.

[The information referred to can be found in the Appendix on page 63.]

Ms. TAUSCHER. Without objection it will be submitted in the record.

Dr. DRELL. During the Cold War, nuclear weapons were essential to maintaining international security because they were a means of deterrence. Sixteen years ago, the Cold War ended with the demise of the Soviet Union. Deterrence continues to be a relevant consideration for many states with regard to threats from other states, but reliance on nuclear weapons for this purpose is becoming increasingly hazardous and decreasingly effective as the prospect of nuclear proliferation grows increasingly ominous. The time is overdue for a fresh look at the role of nuclear weapons in U.S. defense planning.

It should be clear that I am saying different words from Secretary Bill Perry, my friend, but I am agreeing on everything he said.

As stated in the joint declaration of Presidents Bush and Putin in November 2001, quote, "The United States and Russia have overcome the legacy of the Cold War." Neither country regards the other as an enemy or threat. They emphasized that the two nations are allies working together against the spread of nuclear weapons.

In light of this official change in policy, I have trouble understanding why we are still planning, or certainly seem to be planning based upon the stated documents under the Treaty of Moscow negotiated in 2002, to have 1,700 to 2,200 strategic nuclear warheads deployed 5 years in the future from now, supplemented by several thousand more reserves in the stockpile. What are these multi-thousand warheads for?

I argue in my testimony, that was guided by the 2001 Nuclear Posture Review that you referred to, Madam Chairman, a U.S. strategic force of some 500 operationally deployed strategic weapons would be more than adequate, strategic warheads. This number allows for force readiness concerns, multiple targeting where needed, the possibility of very sudden and unexpected surprises, from Russia, for example, a breakdown in military command and control, or for whatever reason.

In order to provide a considerable degree of flexibility and a fluid security environment as present and which the Nuclear Posture Review calls for, the 500 operationally deployed strategic warheads would be augmented by a responsive force. As we look ahead a few years into the future that responsive force should have on the order of 400 to 500 warheads, a number comparable to the operationally deployed ones.

In sizing our nuclear forces for the future, the U.S. and Russia, who presently possess more than 90 percent of the worldwide total of nuclear weapons, will have to enter into multilateral negotiations with other nuclear weapon states as we make significant force reductions. These numbers that I have proposed above as-

sume that such negotiations are successful in establishing a nuclear-restrained regime, and of course, Russia in their reductions follows along our path.

As Russia and the United States move further away from the nuclear deterrence trap in which we are still ensnared, the sizing of our stockpiles would depend on other concerns and could be further reduced and, in time, perhaps a decade, nuclear deterrence might be maintained, and I would hope so, entirely with the responsive force alone. That might be on the order of 500 now initially proposed to be in the operationally deployed force.

These arguments are worked out in more detail in an article written several years ago with Ambassador Goodby which I have previously submitted a copy of.

These actions, let me summarize this part, these actions by the two powers that still possess more than 90 percent of the world's nuclear warheads would be a powerful stimulus toward preserving and further strengthening the non-proliferation regime that is presently under severe strain, particularly but not exclusively, from North Korea and Iran.

In order to give an impetus to prospects for achieving further reductions in these forces, the United States and Russia will have to negotiate an extension or revision of the formal provisions for verifying such measures of reduction by extending or revising, as I say, the provisions of the existing START Treaty that will expire in December 2009. There is little time for delay in getting started, and I strongly endorse your call for getting down to business on that one, Madam Chair.

Turning to the RRW. Beyond numerical reductions in our nuclear forces, measures of restraint by the United States in managing and modernizing our nuclear arsenal will also be important to achieving success in meeting challenges to the non-proliferation regime. If the United States, the strongest Nation the world, were to conclude that it cannot protect our vital interests without relying on new nuclear weapons for new military missions, it would be a clear signal to other nations that nuclear weapons are valuable, even necessary for their security. It would also be counter to their repeated urging that the nuclear states reduce reliance on the weapons, reduce numbers of these weapons and work toward ratifying the Comprehensive Test Ban Treaty. Indeed, that was a condition at the United Nations (UN) in 1995, to get most of the nations all to sign on to the extension of the Non-Proliferation Treaty.

This brings me to the RRW then, whose stated purpose is both to transform the nuclear infrastructure, that is Stockpile 2030, and the nuclear weapons themselves so the U.S. can maintain its alleged long-term high confidence in our arsenal as it reduces its size.

The part of the RRW program directed at transforming the nuclear infrastructure is not controversial. The infrastructure needs attention. Some of it dates back to World War II. If you visited, you would see how obviously it needs attention.

However, in planning a modernized nuclear complex that will be more efficient, flexible and environmentally friendly to maintain, we need to decide first how big an arsenal do we think we need; 5,000 or 500, for example. This will require developing an updated

plan for the future U.S. nuclear policy and force posture that this committee has called for.

The more difficult and contentious part of the RRW program is the transformation of the current stockpile with newly designed warheads that will increase long-term reliability, safety and use control. It is a daunting challenge to achieve these goals without resuming underground nuclear explosive tests in order to certify the newly-designed warheads for deployment. Such a restriction on no testing legislated by Congress is important for our Non-Proliferation Treaty interests, as Secretary Perry has amply stated.

We are faced now with a key question then: Can we achieve the goals of the RRW program without underground explosive testing? Recall that in developing our modern arsenal, the U.S. has performed more than 1,000 tests over 50 years. How confident could we be in certifying a new weapon that doesn't have such a strong test pedigree?

The ongoing vigorous and highly successful Stockpile Stewardship and Life-Extension Programs have established that the current U.S. stockpile, in my judgment, of nuclear weapons is safe and reliable and does not show significant evidence of aging. That is the basis for my technical views of what I am talking about.

Those programs do include important improvements in non-nuclear components events, for example, continually improving the safety of the arming, fusing, and firing system and enhancing performance margins. That has enabled the lab directors to certify our stockpile without testing for more than a decade.

I don't thing we presently know the answer to the key question I pose. We are not technically certain what aspects of an RRW program can be achieved without nuclear explosion testing. I do believe it is a worthwhile question to try to answer, and there is a sensible approach to it which would follow three elements.

One, the RRW needs to proceed carefully with research on design modifications before moving ahead to consider development and manufacture of nuclear warheads. In other words, it has to stay at the moment in phase 2A. Detailed analyses subjected to independent scrutiny and rigorous peer review will be needed to determine whether it is possible to build confidence and a strong technical consensus that the proposed changes are mutually compatible with our security needs and that they will be able to give us higher confidence in these changed designs, untested, than we have presently in the reliability and confidence of our present stockpile.

Second, we must recognize that implementing design changes is not time urgent. The legacy stockpile is strong. The pace of the work should not consume human and budgetary resources to the extent of savaging the important and highly successful Stockpile Stewardship and Life-Extension Programs that are going on now. It will take more money if you want to consider doing that.

Third, the government needs to be clear about the limited scope of the RRW program to avoid potentially harmful impacts on global non-proliferation efforts that Bill Perry has already talked about, which I strongly endorse, and we can think about the long-term future where maybe with Reagan and Gorbachev, we can see a world free of nuclear weapons.

[The prepared statement of Dr. Drell can be found in the Appendix on page 46.]

Ms. TAUSCHER. Thank you, Dr. Drell.

Welcome, Dr. Payne. We are happy to hear from you.

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

Dr. PAYNE. It is an honor to be here. Thank you for the invitation.

The rise of hostile rogue states, new terrorist threats, the proliferation of weapons of mass destruction and missile technology have all highlighted our need for an effective deterrent strategy in this post-Cold War environment. That strategy in principle should help us to identify the preferred roles and characteristics for our strategic forces.

Unfortunately, most of what we believed was true during the Cold War is now misleading because international conditions have changed so dramatically. The painful truth is now no one truly knows what constitutes a stabilizing force structure or whether or how deterrence will work across the wide spectrum of contrary opponents, stakes and circumstances we may confront.

This conclusion does not suggest that we discard deterrence—far from it. It does, however, explain how our Cold War strategy of deterrence based on a mutual balance of terror must be reconsidered in toto. One part of the answer to our current strategy question of how to deter is tailored intelligence.

To understand how best to deter in any contingency, we need first and foremost to understand the specific opponent's mindset and behavior style and the different ways opponents can perceive and respond to our threats. Deterrence is now first and foremost a matter of intelligence. It requires a much broader dedicated intelligence effort for this purpose than was the case in past decades. This is true whether we hope to deter the leadership of a state or a terrorist organization.

I should note in this regard that I have frequently heard the assertion "terrorists must be undeterrable," which is mistaken. There is considerable historical evidence that terrorists may be deterred and have been deterred in the past, depending on the specifics of the opponent, the circumstance, and how much we knew about them.

It is important to understand what types of U.S. deterrent threats will be best suited to deterring a particular opponent in a particular circumstance, for a particular purpose. In some cases, non-military approaches to deterrence will be best, in other words, non-nuclear force options are likely to be adequate and advantageous, and in still other cases, nuclear threat options may be necessary to deter.

Each type of capability is likely to have a role in deterring attacks. To reject any of these capabilities at this point as unnecessary for deterrence is to presume knowledge about how foreign leaders will think and how deterrence will function across time and place that is wholly unsupportable.

Some see an incongruity in the U.S. maintaining a nuclear arsenal for deterrence while simultaneously advocating nuclear non-proliferation. In reality, the U.S. deployment of nuclear capabilities makes an essential contribution to nuclear non-proliferation. This positive linkage may be counterintuitive, but it is unquestionable.

Our extended nuclear deterrent is perhaps the most important and the least recognized nuclear non-proliferation tool in existence. How so? It is on the basis of the U.S. nuclear umbrella that allied countries, such as Japan, have chosen to remain non-nuclear. The continued credibility of our nuclear umbrella is critical to their decisions to remain non-nuclear, and their decisions to remain non-nuclear are critical to non-proliferation worldwide.

The contemporary environment is increasingly challenging for our allies in this regard. North Korean and Iranian nuclear aspirations for nuclear weapons pose an unprecedented nuclear threat to our allies, including those traditionally covered by the U.S. nuclear umbrella. Their responses, as we have seen to date, to these emerging nuclear threats have highlighted once again the critical role that the U.S. extended nuclear deterrent plays in non-proliferation.

It is in this context that the Reliable Replacement Warhead (RRW), is of potential value, I believe, for the following basic reasons. It may contribute to sustaining a U.S. nuclear arsenal with increased warhead safety and security measures without testing. It could help preserve the special skills and expertise necessary to maintain the U.S. capability to develop and produce nuclear weapons and to modernize portions of the industrial infrastructure necessary for that purpose. And RRW could contribute to the prudent reduction of the nuclear stockpile.

Because the retention of U.S. nuclear capabilities is important for U.S. deterrence, and extended deterrence—and therefore non-proliferation—each of these possible benefits of RRW is potentially important. The Bush Administration's 2001 Nuclear Posture Review, the NPR, emphasized the need for a much broader range of deterrent options than those we inherited from the Cold War, particularly including non-nuclear options. Unfortunately, here we are almost six years later and nuclear-armed missiles remain the only Prompt U.S. Global Strike options available. I agree strongly with General Cartwright that it is important to move forward on a conventional capability for Prompt Global Strike (PGS), conventional Trident being the near-term option.

The contemporary uncertainty of deterrence compels a review of our Cold War strategy choices with regard to the role and value of active and passive defenses, such as air defense, civil defense and ballistic missile defense (BMD). It may be recalled that it was the Nixon Administration that initiated the strategy of intentional U.S. societal vulnerability to virtually any strategic threat. The Nixon Administration did this in the self-expressed deference to a balance of terror strategy with the Soviet Union. The strategy choices have consequences, as we learned on 9/11 when, according to reports, we could muster at most a handful of interceptors, two of which apparently were unarmed.

That strategy, and its subsequent perpetuation, led to the continued limitation or further degradation of U.S. air defense, civil de-

fense and ballistic missile defense throughout the remainder of the Cold War years and after, the fruit of which we saw at 9/11.

In the contemporary environment of multiple WMD threats and deterrence uncertainty, it is critical that the U.S. approach to deterrence strategy include rather than eschew defensive capabilities. A balance of terror will not provide predictable protection against perplexing leaders, such as North Korea's Kim Jong Il or Iran's President Ahmadinejad.

Deterrence can and likely will fail unpredictably in the future as it has in the past, and in those instances, it will be most important to limit damage to our society and to our economic infrastructure to the extent possible.

Particularly apparent in this regard is the need to deploy regional and strategic missile defense capabilities that are sufficiently timely, adaptable and global to meet emerging missile threats. With regional rogue states moving toward nuclear weapons and missiles of increasing range and payload, layered missile defense, I believe, has become an essential element of U.S. post-Cold War strategy.

In conclusion, the broad outlines of a U.S. post-Cold War deterrent strategy are apparent. They reflect both continuities and discontinuities from past strategies. Once we establish a political consensus on the hows and whys of U.S. post-Cold War strategy, we can pursue the development and deployment of our forces consistent with that strategy.

Unfortunately, we have yet to establish a consensus on a post-Cold War deterrent strategy, and we need to make that a priority. Madam Chairman, I believe the commission you mentioned in our opening remarks could contribute significantly toward that goal. Thank you.

[The prepared statement of Dr. Payne can be found in the Appendix on page 53.]

Ms. TAUSCHER. Thank you, Dr. Payne.

We have been informed that the House is currently debating the Labor, Health and Human Services and Education Appropriations bill. We expect we could be called for a very long series of votes imminently. I know that Dr. Perry has been on the Senate side most of the day, and Dr. Payne and Dr. Drell have both traveled.

I would ask your indulgence if it would be possible, if we get called for votes soon, it would take us a minimum of 45 minutes to do these votes. I would hope that you could stick around. This is a very important issue, and I ask your indulgence. We can make you comfortable in the meantime if we do get called soon.

We are going to keep members to the five-minute rule, myself included. I have one opening question. Dr. Payne, I will take your last comment as a hint of where you are for our call for a strategic commission. The question is very simple. As you know, in the House-approved 2008 Defense Authorization bill we have called for a strategic commission to evaluate United States strategic posture for the future, including the role that nuclear weapons should play in the national security strategy.

Dr. Drell, what do you think are the key questions the commission should focus on? And this will be a five-minute question. If you could be brief, I would appreciate it.

Dr. DRELL. You wanted my view of the commission?

Ms. TAUSCHER. Yes.

Dr. DRELL. I think it is extremely important.

Ms. TAUSCHER. What should they focus on?

Dr. DRELL. I think they should focus on what deterrence requires after the Cold War. With deterrence during the Cold War, we had huge forces for immediate attack. We now need to keep deterrence so we have some way to handle building crises if they come. I don't think that the fear of a first-strike exists today the way it did during the Cold War. I take seriously the document that President Bush and President Putin signed in 2001/2002 saying we are not Cold War enemies, literally, but we are allied against terrorism.

I think that deterrence, assuming that the Russians implement their words the way we do, I think that having multi-thousand warheads to be able to destroy an operating society is something I would like to think of as in the past.

On the other hand, we have to have a hedge against a change in the Government or continuation of what seems to be at the moment a not very happy political relationship, and that is why I chose numbers like 500 operationally deployed, 500 reserve, looking at the key targets.

So I think one has to look upon what is the deterrent posture we are working on for the future; how do we understand where Russia is going? That is the main thing, because we are between 90 and 95 percent.

Then I think that the issue, I feel very strongly, is what actions can we take to make progress in the way we handle our forces and make progress toward freeing the world of nuclear weapons? I think President Reagan and President Gorbachev had it right. Reagan said these are terrible weapons, no good. They are going to kill us. We have to get rid of them. That man was a true nuclear abolitionist of the deepest sort.

I think that given the fact of the spread of technology, the biggest worry we have is, building on what Secretary Perry said, the spread of these weapons. We have to now embellish the nuclear Non-Proliferation Treaty with the Proliferation Security Initiative, the additional protocols for inspection, and expanding Nunn-Lugar. Because somebody less reliable than we like to think, and using methods of suicidal terrorism to make almost mockery of the word deterrence, is the challenge we face.

As long as we have massive nuclear arsenals, we are going to have that problem. So we have to ask, how do we take steps? By making significant reductions, as I said, by taking weapons off hair-trigger alert, by controlling the nuclear fuel supply—things that this country has proposed.

How do we work our way out of the nuclear deterrence trap and toward that? To the extent that we can persuade other countries—I am not talking about only Iran or North Korea, I am talking about our allies with whom we are cooperating, 185 nations in the world—to try to make the Non-Proliferation Treaty effective. They have demanded increasingly, and if you look at the record in 1995 of the renewal of the Non-Proliferation Treaty and to the indefinite future, they demand that we honor Article VI of the NPT, that we ratify the Comprehensive Test Ban Treaty, certainly don't resume

testing, and that we reduce reliance on these weapons. And if we want them to be serious partners in an effort to try and get a hold of this nuclear journey, we have to listen to them and take it seriously.

Of course, it will help with some leverage in dealing with Iran and North Korea, I would think, if we say we are really serious about big reductions and reducing reliance and maybe even, I don't know when or how, we will get to that vision of a world free of nuclear weapons. I think those are what one has to now take a big look at the big picture.

Ms. TAUSCHER. Dr. Payne, Dr. Perry, I will take your answers for the record if you don't mind because I want to get other members.

Mr. Thornberry for five minutes.

Mr. THORNBERRY. Thank you, Madam Chairman.

Dr. Payne, I was struck in the introductory comments that Dr. Drell talked about the Bush-Putin agreement that we are no longer Cold War enemies and we can thus reduce tremendously the number of nuclear weapons we have. And yet Dr. Perry went on at some length about Russia taking steps in the opposite direction, having more reliance on nuclear weapons and so forth since that time. It tells me that Russia is making decisions based on what it considers its strategic interests are that are not particularly related to decisions we make.

So would you comment on this question about whether other countries will necessarily follow our lead or whether—whether it is Russia, Iran or whoever—they look at their own situation, who their neighbors are, what their security environment is and make decisions on nuclear weapons on that basis?

Dr. PAYNE. Sure, thank you, Congressman Thornberry. Both the comments in fact I believe are accurate, and that is that at the time of the Nuclear Posture Review early in the Bush Administration, there was no doubt that the goal was to have a new relationship with Russia, and that that new relationship would improve and blossom. That was the hope, and that was one of the guiding ideals behind what we did in that regard.

I harken to add with some disappointment that, six years later, what we have seen on the part of the Russian Federation with regard to its programs and its plans and its development of nuclear weapons is not heartening in that regard. What we have seen is increased emphasis in Russian writings and in Russian development programs on nuclear weapons. Many possible reasons for that, but it certainly hasn't been what we hoped would be the case back at the beginning of the Administration.

To the second part of the question, and that is, do countries essentially follow the U.S. lead? I believe, by and large, they don't. The notion that countries follow the U.S. lead in nuclear matters and that essentially they mimic what we do or don't do really is a carryover of what used to be called the action-reaction dynamic of the arms race. What we would do in the Cold War, the Soviets would follow, and so on and so forth.

What happens is that same notion of what drives arms competition has now picked up and has been applied to the post-Cold War period, so the current notion is that what we do, then many other countries will follow and mimic. I don't find virtually any historical

precedent or evidence that supports that. What we do see is regional states want nuclear weapons for their own purposes. Very often it is unassociated with the United States. If it is associated with the United States by their own discussion, it is because they worry about U.S. conventional capabilities, not U.S. nuclear capabilities, *per se*.

And so the notion that what the U.S. does with regard to its nuclear initiatives is going to drive proliferation in that regard is overstated. To the contrary, I believe that U.S. nuclear weapons that help support the extended nuclear deterrent can be helpful in contributing to non-proliferation.

Mr. THORNBERRY. Let me ask one other question, Dr. Perry and Dr. Drell. Dr. Payne makes the point that we need a whole array of tools because many of us can't possibly know what will deter a leader or a terrorist in the future, and that whole array extends from, of course, non-nuclear all the way to nuclear deterrent.

Do you agree or disagree with that notion that we need the whole array of weaponry to help prepare for contingencies we couldn't possibly know now?

Dr. PERRY. If I were setting the nuclear policy of the United States, which I am not, I would base it on the view that the greatest threat to the United States' nuclear weapons is nuclear terrorism, and act accordingly. That is further based on the belief that deterrence will be effective against nation states, and in that, I even include North Korea, Iran. I do not believe those two nations are seeking to commit suicide. They realize, that is, what would happen if they used nuclear weapons against us.

I do not believe that deterrence would be effective against an al Qaeda group. So I would want to base my policies on the view that we have to deal with al Qaeda some other way.

All my testimony was intended to describe ways of dealing with that problem. I do not believe deterrence, defense, any of those will be useful against al Qaeda.

Mr. THORNBERRY. Thank you.

Dr. Drell.

Dr. DRELL. I believe we do have to have a whole array of armaments, and I believe that—I would hope that the emphasis is on having the necessary intelligence, which I agree with Dr. Payne in emphasizing that as very important, and having a flexible and strong conventional force.

I just think these nuclear weapons, as President Eisenhower said, are weapons of destruction of the enemy and suicide when you come to using them. And we want to try and meet our needs as much as we can with the whole array.

By the way, when it comes to defense, when we are talking about trying to strengthen our ability to contain the terrorists, the biggest threat, I think what Bush and Putin said five years ago, also that we should be engaged in cooperative efforts at early warning and defense, is the right way to go. I think I am troubled at what seems to me to be an unnecessarily provocative way of trying to introduce it into Eastern Europe right now. I don't understand why that was not approached as a possible cooperative move because I can see that as the offenses get down and the weapons may proliferate, we have to have some sort of appropriate level of defense.

Dr. DRELL. In fact, against that low-level defense might even be effective.

Ms. TAUSCHER. Thank you.

Mr. Spratt from South Carolina for five minutes.

Mr. SPRATT. Thank you all for your excellent testimony. We appreciate you being here.

Dr. Perry and Dr. Drell, you have each said that you look upon the gravest threat confronting us being the threat of nuclear terrorism. If, however, someone were to read our defense budget from start to finish with no outside knowledge of it, I doubt seriously that he would infer or discern that this is our greatest threat.

Are we spending or putting forth the resources commensurate to the threat?

Dr. PERRY. In my judgment, the answer to that is no. There are many things we could be doing that would make it more effective against dealing with that threat. One in particular would be an expanded Nunn-Lugar effort expanded to include other nations and expanded to include dealing with the fissile material from commercial reactors, which is perhaps our greatest single danger today falling into the hands of terrorists.

I might just add to that, Mr. Spratt, that resource funding is not enough to deal with this problem. We do need the cooperation with other nations. We have to have the cooperation of all nuclear nations at a minimum in this program. At the time I was secretary, we had splendid cooperation from Russia in this field. We could not have accomplished the dismantlement of the 4,000 or 5,000 nuclear weapons in the former Soviet Union without help from Russia.

So we do need the cooperation of other nations in doing this.

Dr. DRELL. I totally agree.

Once we have—if our problem is nuclear terrorism, the better intelligence we have, that is, again, something that requires cooperation, the better—the more effectively we extend Nunn-Lugar to the Global Threat Reduction Initiative (GTRI), the better we can proceed to get control of the material and the enrichment technology. These are the matters that concern me much more.

The nuclear force at the moment, at the level we are, is really sized for only one other country, and that is Russia, which, as I say, we shield more than 90 percent of their weapons. To the extent that we can reduce and parallel—their numbers, by the way, Congressman, their numbers have gone down to smaller than our numbers now. They have begun the modernization of delivery systems, I personally don't feel that they are fielding a force that carries the threat that a communist Soviet Union presented to us.

So I don't know the details of the budget to know where there are things that are there or not. But I certainly put my reliance in intelligence, conventional forces, a whole broad range of them for all sorts of time range of action and all levels.

Mr. SPRATT. Dr. Payne.

Dr. PAYNE. I certainly agree with the points that Dr. Perry and Drell have made to keep materials out of the hands of terrorists. Nuclear materials, biological weapons, chemical weapons materials, I couldn't agree more with that.

I guess the different point that I would put forward in this regard is that the deterrence of terrorists has been shown historically

to be possible. Under President Jefferson, we were to, in fact, deter and coerce the pirates that were every bit as violent and every bit as eccentric as the terrorists we face today. And there are any number of historical examples since then. There are many of them.

We have seen very effective deterrence and coercion of terrorists both by direct deterrence of the terrorists themselves and by deterrence of their state sponsors. That is where I think that, in a sense, we need to focus and that is understanding the terrorists well enough and the organizations well enough to understand those occasions where we can put deterrence pressure on them directly, and those occasions where we can add pressure on their state sponsors to try to prevent their actions.

Ms. TAUSCHER. Thank you, Mr. Spratt.

Do you have another question?

Mr. SPRATT. Neither one of you mentioned, I believe, the D–5. Would you quickly give us your position on whether or not the D–5, the idea that the Administration has advanced of possibly converting the warhead of the D–5 into a conventional warhead and using it for conventional missions is a good idea?

Dr. DRELL. I am deeply troubled by the notion that a Trident force would be at sea with a mixture of nuclear and non-nuclear weapons. And therefore, there might be some ambiguity in the way a launch might be perceived, and there might even be a command failure in getting a conventional warhead or a nuclear warhead being launched confused.

I am deeply troubled by the notion of a mixed deployment of nuclear and conventional.

I think there is an argument to be made for—I presume you are talking about—D–5s with conventional warheads. There, I have just technical problems when you think of how limited the range of destruction is from a high explosive warhead and the requirement to have the location of the target which you are going at in a very timely fashion to have that so well fixed and accurate that you really are hitting what you think you are.

I mean, there are technical problems that have to be solved which are non-trivial. I have no doctoral concern about having the ability to deliver force promptly, whether as the D–5 or having overseas-based drones or whatnot. There are options which haven't been thought through totally.

But certainly a mixed deployment is something that makes me very nervous, not because I don't trust the U.S. Navy—I just don't trust the alert systems or the warning systems of the people who may see something coming and be a little less confident than we are that it is non-nuclear.

Dr. PERRY. Mr. Spratt, I focused my testimony on the nuclear terrorism attack, but in my written testimony, I do refer to what still lingers of the danger of an accidental war occurring. That probability is certainly lower than the ones during the Cold War, but it still exists because we and Russia still have our nuclear forces on high alert.

That danger, I think, is aggravated by a Trident of mixed forces. I mean an accidental response on the part of the Soviet Union, by Russia, which might misestimate what is happening when we fire a Trident missile.

Dr. PAYNE. May I add to that?

Ms. TAUSCHER. You can quickly.

Dr. PAYNE. There is a more recent discussion, I believe, the word is slugsome, which is the idea of putting a shorter range ballistic missiles on the SSGN, which would not be mixed boatloads of nuclear and conventional, would not mix the boatloads at all, in fact, in my view, it has a lot of advantages.

So I think having Conventional Global Strike is very important and this is an initiative to get by those problems that were associated with conventional Trident. It seems to me like a very good idea.

Ms. TAUSCHER. Thank you, Mr. Spratt.

Mr. Franks from Arizona for five minutes.

Mr. FRANKS. I would just like to start out by saying to this panel that I rarely have heard, since I have been in Congress, a more brilliant and obviously knowledgeable group of leaders on such a vital subject. It gives me hope, and I think that the chair is to be commended for inviting people of such acumen to brief us. It is—I am sure that part of it is—that one is always thrilled to hear their own convictions fall from others' lips, but the reality, I am sure, is that there is a diverse point of view philosophically on the panel, but the Nation is very blessed to have all of you with the obvious background and commitment to freedom that you have.

With that said, Dr. Payne, I was particularly intrigued and compelled by your assertion that the American nuclear umbrella has many effects on nuclear proliferation; number one, by preventing other countries who are under that umbrella to feel they need to develop systems of their own. And I guess being a little biased here, relating to the nuclear missile defense systems of the Nation, do you not think there may be some connection with our missile defense capability also being able to deter certain countries from developing systems of their own simply because they think that they would be of little effect or lesser effect because of our missile defense capabilities? And if you would expand on that.

Dr. PAYNE. I believe that there is at least the prospect that effective missile defenses can help dissuade countries from either going into the missile business or expand their missile capabilities if they anticipate that our defenses will be sufficiently effective to shut down the value of those missiles. The last thing they are going to want to do is launch a missile and have it disarmed by the United States. It simply proves their impotence.

So I agree with you, and I believe that there is this chance for dissuasion or dissuasive effect from our strategic capabilities.

With regard to the first part of the question, that is the relationship between our nuclear forces and extended nuclear deterrence and non-proliferation, this strikes me as one of the most unheralded values our nuclear arsenal can provide. If you look most recently of the statements that have been coming out of Japanese officials, former Japanese officials, South Korean officials, former South Korean officials, if you look at the discussion that has come out of—from friends of ours in the Middle East, as they anticipate the possibility of uranium nuclear weapons, what you see highlighted in every case is the value that they attribute to our ex-

tended nuclear deterrence to help them in their security needs as they look at the possibility of facing a nuclear foe.

And they value our essentially taking that nuclear deterrent role so they can stay in their non-nuclear status. That strikes me as an extremely important value for our nuclear weapons, and as we think about the proposals to get out of the nuclear weapon business, we ought to think about that down side of doing that.

Mr. FRANKS. Thank you. I couldn't agree with you more.

Related to the European site, is it not also possible that the American credibility in proceeding with that site as planned also has some intrinsic relationship to some of the things that you are talking about?

Dr. PAYNE. I believe there is no doubt that the commitment that it shows by the United States to our allies in Europe, particularly those in central Europe, the newer members of NATO, is important. It is important to those members of NATO as a political signal, as a symbol of our commitment to their security, yes.

Mr. FRANKS. Dr. Perry, I think one of the strongest points made today was yours related to weapons systems falling into the hands of terrorists. Deterrence has no effect on them. Their intent is clear. We need to rob them of that capability. It occurs to me if we hadn't lost secrets from the Los Alamos Lab many, many, many decades ago, the Cold War itself could have been entirely avoided. And with that in mind, what would you say would be the most practical and critical consideration for this committee in preventing this loss or this proliferation problem in getting some type of weapon system getting into the hands of a terrorist organization. What are the things that we need to be looking at most closely?

Dr. PERRY. I think we are already doing adequately the protection of our nuclear weapons. We should also work with other countries like Russia to help them secure their nuclear arsenal. But we have done that in the past, and we can still do that in the future.

But I think the greatest threat is fissile material falling into the hands of terrorist, but I generally believe that the danger of a nuclear weapons falling in the hands of a terrorist is relatively low. The high danger is that fissile material will fall into the hands of a terrorist. And here the greatest danger is not the Defense Department fissile material, which is pretty well protected, but the fissile material from nuclear reactors.

So I think the single most important thing we can do is get an international program to deal with that problem. That involves much better safeguarding material and it involves persuading people who have reactors which use highly enriched uranium to change. It is an extensive program. It would require a lot of diplomacy including a lot of fund resources, but the payoff is quite high.

Mr. FRANKS. Dr. Drell, I think Dr. Perry puts it very succinctly. The fissile material seems to be one of the most dangerous combinations out there with Iran moving in that direction pretty dramatically. I sometimes go back and forth wondering if Iran is the most dangerous threat to us or if perhaps a coup in Pakistan where they perhaps would immediately gain control of a dozen or so warheads would be more dangerous.

I want to be careful not to say anything too sensitive here. But the fissile material, once that is gained, they don't need to have

much more than a Boy Scout manual to create some kind of havoc. And what would you suggest is the most dangerous area? I keep trying to bring, as a committee, our focus on the most critical factor there, but as far as being able to prevent this fissile material from falling in the hands of terrorists, where do you think our greatest focus should be? I know it has to be comprehensive, but do you see any particular weak point that we should be considering?

Dr. DRELL. Well, on the diplomatic front, we are making an effort to build an international order to get control for the enrichment of uranium. You only need very low enrichment to power a reactor for civil power, which is what countries want. But once you have that technology, you are well on the way to being able to get high enrichment. The numbers are all unfavorable to us on that one.

That is why it is so important what the United States Government's proposal is, what President Putin's proposal is, what the IAEA proposals are. There are different proposals but they are different in detail, not in goal, and that is to see to it that the technology for enrichment does not spread, and that is why we are deeply concerned properly with what Iran is doing now as with the gas centrifuges as it begins to enrich uranium.

So what are the things we have to do? In Iran, we either are going to have to, by diplomatic means and engagement with our allies, convince them that that is something that would look very, very badly about their getting the capability of enriching uranium because with the enrichment and the weapons and missiles, there is going to be a terrible shakeup in the Middle East and the nonproliferation regime is going to go down the tubes.

So I think that the most dangerous spot for me right now is what is going on right there with Iran and with the turmoil in Pakistan because you have the world's most dangerous arm's dealer A.Q. Khan sitting up there in Pakistan, obviously a very terrible person, doing things.

So how with intelligence, how with diplomacy, and eventually after that, there will be some very tough political decisions of what we are going to have to do when we feel the danger becomes beyond something we can bear.

I take momentarily, at least, great confidence—great hope that we are beginning to resolve the problem with North Korea. I think, finally, China has realized it is not in their interest to have North Korea nuclear with what it will do to South Korea and to Japan to perhaps Taiwan. And so I view their help and our very aggressive diplomacy there recapturing a lost, seemed like a lost cause, having some effect right now. So I am hopeful there.

Let me take one minute to answer a previous remark.

I am a physicist, and I have to say your remark about the spies of Los Alamos having something to do with the Soviet Union getting weapons quickly, I have to say respectfully, sir, I really disagree on that. The history will show that they had designed their own weapon. In fact, the Russian scientists are very proud to tell you that had they made their first test their design. It was more efficient than our first creation of a bomb, to copy that one and they could make it work.

So I think the scientific talent and the scientific knowledge needed to make a primitive atomic bomb, either uranium gun-type one,

which is Hiroshima, or the more sophisticated plutonium implosion one, which is Nagasaki. I am sorry that that technology is getting around the world. That is our danger now. It wasn't so much in the Cold War, but I don't think one can say that it had that much to do with the Soviet threat emerging when it did.

Mr. FRANKS. Thank you, gentlemen. I think your lives give those in the future generation hope to live in a future environment.

Ms. TAUSCHER. I appreciate your accolades in the beginning, and as chair, I take them to heart, but I do have to tell you that it is our staff that does the fabulous job, led by Bob DeGrasse and Rudy Barnes and Kari Bingen and my staff, that they are significantly the reason why we have such a fabulous panel here today.

So I want to thank our staff, and I want to turn to Mr. Larsen who has been waiting patiently for seven minutes.

Mr. LARSEN. So I get three?

Dr. Payne, I want to give you an opportunity to answer a question and because it has to do with something with the comment you made with regards to Mr. Franks' question about the prospect of missile defense being a dissuasion. I am going to ask this in a pretty loaded and pointed way. I thought I would be nice enough to let you know that.

So what do you think is likely with the prospect of an Iranian nuclear weapon and the prospect that missile defense will dissuade an Iranian ballistic missile development?

Dr. PAYNE. There is not enough data to give you possibilities or comparisons of those.

Mr. LARSEN. You did say there was a—you thought the prospect of—there was a prospect of missile defense being a dissuasion.

Dr. PAYNE. I was relating that to the Iranian missile program, not necessarily to the Iranian nuclear program.

Mr. LARSEN. And I am talking about an Iranian nuclear weapon.

So my point is, missile defense may have its values, but as we are discussing this in terms of our future nuclear policy. I have some questions, and perhaps this is one of these questions the Commission, should we get it finally approved in a final bill, can look into more clearly for us because I think there might be, at least in my mind, a divergence of those two prospects, actually there is a convergence of those prospects right now in my mind. The prospects of both happening seem to be going fully headlong regardless of what we are doing.

So I hope that is a question that we can look at.

A question as well for you—well, for Dr. Payne.

Again, the credibility of the nuclear deterrent in the Cold War, I think, was based on a couple of things, and I want to get my history right, Dr. Drell, but not only that we had a nuclear deterrent that would work but a nuclear deterrent that we would use. Sort of two things.

So given today's environment, say look at a Saudi Arabia or Japan and a South Korea, what circumstances would we need to keep it credible both in terms of that it works and that we would use it if in fact those are still the two conditions that the countries like Japan, Saudi Arabia and South Korea would like to stop themselves from becoming nuclear. And are those sufficient to keep

them non-nuclear in your view. Are those conditions sufficient today to keep them non-nuclear?

Dr. PAYNE. We can go back a little bit to the Cold War history. Because, in fact, what was supposed to provide adequate credibility to our threat was indeed the capability but not necessarily the certainty of its use. The credibility of the threat was, in fact, supposed to come from uncertainty of U.S. behavior—the fact that the U.S. might do something outlandish, might actually behave irrationally, the fog of war. The uncertainty associated with the U.S. nuclear arsenal was what was supposed to provide the credibility to the nuclear deterrent, particularly extended nuclear deterrence.

But in that regard, I go back because the question really isn't for extended deterrence and the assurance that you have talked about with regard to allies. The question really isn't the extent of which we believe nuclear weapons are usable or not usable. That is an interesting question but it is a separate question.

The question is, do our allies take confidence in assurance in our nuclear arsenal for the extension of deterrence to provide for their security? And you will get many different answers to that question, but it is the appropriate question to ask to our allies, to put to our allies.

I had the opportunity to ask one of our senior officials from one of our allied countries what was it that provided their country with assurance with regard to our nuclear deterrent. This was not that long ago, and his response to me was, "No one has ever asked me that question before." It seems to me that, getting exactly to your question, sir, this would be something that the Commission, for example, could help with and that would be identifying what is it about the nuclear arsenal that provides assurance to allies so that they are happy to remain or at least content to remain non-nuclear.

Mr. LARSEN. That is an important question. Is it sufficient enough because we don't want them to become nuclear, but is that—is that sufficient enough for them, the answer to the question, whatever that answer is, is that sufficient enough for them?

Dr. PAYNE. The sufficiency is going to be determined by the different countries in their different security environments. What might be sufficient enough for Turkey might be a different question than what is sufficient for Japan or South Korea because they face very different contexts.

Mr. LARSEN. Dr. Drell, a question on the SORT Treaty, the Moscow Treaty and perhaps for Dr. Payne.

What circumstances will it take—when we get to 2012—to increase the likelihood of an extension of the treaty or a replacement with lower numbers, and what circumstances would, forgive me for saying it this way, would blow the whole thing up?

Dr. DRELL. When we get to 2012 and before we get there—the SORT Treaty expires December 2009, and therefore unless we do something before then, we have no existing mechanism to verify reductions or any further progress in arm's control. That is why I think the proposal of the Madam Chairman is so important to say we have got to commit ourselves to saying are we interested in another extension or revision, if there need be one, so that we are in a position to talk about lower numbers.

So that, in my mind, is the first thing.

The next step is how are our relations going with Russia. I mean, we have to see when we get to 2012—the goal of the SORT Treaty—what the Russians are doing. I mean, they are having financial problems. They do have smaller forces now than we do. There are some articles saying we have a first strike capability against them. I don't believe that because I don't believe weapons work 100 percent the way they are predicted all the time. So I am not worried about that.

But we have to be convinced that the start made five years ago in relation to these two countries excluding, for various reasons, which have become somewhat rocky, is how they are going. I don't think Russia is a nuclear threat right now to the extent that I worry about a first strike. But I think that unless we have settled our relations with Russia and we are back on a cooperative course, cooperating against the proliferation, meeting the regional problems, cooperating, I have to say in whatever we do by way of limited missile defense in Eastern Europe against what Iran or what they may do, that would help for me to predict what may happen then.

I am just hoping that joining together with them as they were at Reykjavik in a common vision we could work toward would mean that we both realize that—and Russian analysts, General Dworman is one of them, the leading one, have said they don't need any more than a thousand weapons either on strategic alert. But we are talking about 4 or 5,000 now, when you put our arsenals together.

So we have got some difficult verification issues to handle. Namely, how do we count the reserve or responsive forces not deployed? That is a tougher job. We haven't addressed that.

And so a verification regime, a political regime—it all goes together.

But I would hope that we would be able to, before 2012, realize I haven't heard a rational argument for 2,000 or 5,000 warheads, and I hope the efforts of this committee and of the Congress as a whole to have an update, a badly needed update, on our strategic policy. Where do we want to go, what do we need?

Extended deterrence is important. But when we are not talking about the Soviet Union, we are talking about other new countries, I think extended deterrence has a lot more to do with our conventional forces and our diplomacy to discourage and dissuade a country from going nuclear.

Ms. TAUSCHER. Thank you, Mr. Larsen.

Mr. Loebsack of Iowa for five minutes.

Mr. LOEBSACK. Thank you, Madam Chair.

Just a couple of quick questions, I guess a comment, too, about deterrence. Certainly we might want to look at Negal and figure out why we didn't succeed in that case.

But Dr. Payne, you mentioned, if I got this correctly, that you think it is possible to deter terrorists and you mentioned deter and coerce, those are not the same thing obviously, when you were talking about the historical examples.

How specifically would you suggest it is possible to deter terrorists, especially when many of us here probably and certainly out on the general public think that terrorists, in particular, those who

are suicide bombers or whatever the case may be, I mean, it doesn't seem logical to think that we can deter them. How can we do that?

Dr. PAYNE. Thank you.

There is no singular formula for deterring terrorists. The question is going to be are we going to understand the terrorist organizations to know exactly if they are susceptible to deterrence and if so, how? The only thing I can suggest to you is that there are a number of very recent historical examples where terrorists were deterred and/or were coerced effectively.

For example, the Soviet Union was able to coerce Hezbollah in 1985 to get the return of three Soviets who had been kidnapped in Lebanon. There has been a recent discussion in Russia with lots of memoirs written about how this was done, and it was clearly a deterrence and coercive action purposely taken by the KGB to get their citizens back who were being controlled and captured by Hezbollah, and they worked through Iran, for example. That was the indirect approach that they took. They worked indirectly through Iran with coercive measures, and they worked directly on the ground in Lebanon against Hezbollah, and they were successful.

So what I can provide you with is examples of how it has been done in the past. What I can't do is give you a single formula that works with all terrorist organizations.

Mr. LOEBSACK. I think examples of how it might be done would be helpful in that sense.

You also mentioned something that deterrence would probably fail against Kim Jung Il and Ahmadinejad. Is that correct? Did you say that deterrence would likely fail against those two?

Dr. PAYNE. No. What I said was as we look into the future given the uncertainties of deterrence, I think we can be confident that deterrence will fail some time in the future as it has failed in the past, whether it be specifically against North Korea or Iran is an open question.

Mr. LOEBSACK. Can you think of what sort of examples or what conditions under which deterrence might fail?

Dr. PAYNE. Again, there are an endless string of historic examples of why deterrence has failed in the past. We can categorize these and in some cases they simply don't believe the threat. There was the audience that we would hope to deter may see the capabilities, but they do not believe the threat would be implemented for some reason.

Other cases in which the audience that we would hope to deter and others have hoped to deter, they see the capability, they actually believe the threat, but the action that we or others have asked them not to take is of such an overriding imperative that they are so cost-tolerant and so risk tolerant and that they are willing to go ahead anyway.

In other cases, the leaders have seen the United States as essentially as a sloppy democracy that will not respond promptly or likely at all and therefore they have been willing to go ahead with severe provocations at us. They found out they were wrong, but they weren't deterred by our inherent capabilities. There are many historic examples of those types of processes taking place.

Mr. LOEBSACK. Those are my only questions.

Ms. TAUSCHER. Dr. Drell and Dr. Perry and Dr. Payne, I have a homework assignment for you because I want to have—obviously our votes are not as predicted, so we are going to continue and hopefully if we get called, we will conclude the hearing.

But the idea of some kind of negotiation to have a follow-on START Treaty. If you could, all three of you for the record, if you don't mind, respond to us at your leisure.

What kind of framework would that take. What kind of opportunity—this is not an oral question, Dr. Drell, this is a written question for later because I want to go to Mr. Thornberry. But if you could give us in writing in the future in the next week or so what you think the framework of follow-on negotiations would be for follow-on START. Do we need a bridge negotiation? There are two new Administrations coming: One in Russia and one in the United States. What do we do to get ourselves into those new Administrations, not find ourselves naked in 2009 without any parts of it because I think the key that you mentioned, Dr. Drell, is that the verifiability component of START enables other things like SORT to actually have legs and have teeth.

Until you have those things, the rest of it is all very nice but frankly, it doesn't really matter.

[The information referred to can be found in the Appendix beginning on page 71.]

Dr. DRELL. You want a framework for a follow-on START?

Ms. TAUSCHER. Yes, thank you. And I am happy to turn to Mr. Thornberry for some follow-on questions.

Mr. THORNBERRY. Let me approach a couple of narrow other subjects I don't think we have talked on yet.

It has been argued that because we continue to have weapons designed for the Cold War, very large mega tonnage for each warhead, that our deterrent is not as credible as it might be otherwise because nobody thinks that we would actually use these very enormous weapons designed for so hardened Soviet silos in other situations.

Briefly, do any of you all have comments on that?

Dr. DRELL. Briefly we don't have the big multi mega-ton weapons.

Mr. THORNBERRY. Not as big as we once did.

Dr. DRELL. We have a whole range of weapons yields. What RRW is doing is at the moment, for example, the first RW1 which decision was made is reproducing an existing weapon but designing it so that purportedly it will be safer and more reliable. It doesn't add to the flexibility or anything at all.

So we have a whole range. Our arsenal goes from low yields to high yields and obviously this is not the forum.

Mr. THORNBERRY. I am just trying to get this basic question, is a range of yields a characteristic which makes sense for nuclear deterrent as we look ahead to these other scenarios beyond the Soviet Union.

Dr. DRELL. The answer is yes, and we have it. Could have more, but we have it, for that reason.

Mr. THORNBERRY. Add Madam Chair, the other I will maybe ask my—another homework question because we have votes.

Dr. DRELL. We lose.

Mr. THORNBERRY. Well, the other issue that has been approached to us, which I would be interested in your alls' view, is that we can reduce the numbers of weapons we have with the Reliable Replacement Warhead, that as we have weapons built largely in the 1970's and 1980's age, and you know, get older and older, we have to keep more of them because as they get older, we don't know what may happen to these machines that age.

So the argument is if we could make them anew, then we—without some of the low tolerances of previous weapon designs—that we could be more assured and we could get by with few of them. And your alls' comments on that, I think the committee might also be interested in.

[The information referred to can be found in the Appendix beginning on page 74.]

Dr. DRELL. Do you want comment now or——

Mr. THORNBERRY. I was going to offer you a homework assignment since we are going to have to go run off to vote. I am trying to work with the chair in case Mr. Spratt had something else.

Mr. SPRATT. I think he can go ahead and submit it for the record.

Ms. TAUSCHER. You all have doctorates. Something tells me you are good at homework.

Dr. DRELL. So is the instruction to answer it right now?

Ms. TAUSCHER. No. It is a homework session.

Because you have been so fabulous in sharing with us your expertise, I think Mr. Franks from Arizona shares all of our opinions. Each of you is enormously talented, and this country is very blessed and the American people are blessed by your expertise, and this committee is certainly enriched by the fact that you are so willing to come and share that expertise with us, and we would hope that you will come back and certainly as time develops and we get our commission up and running, if you could continue to advise us, we would really appreciate it, and thank you so much for being here.

And the hearing is adjourned.

[Whereupon, at 3:30 p.m., the subcommittee was adjourned.]

A P P E N D I X

JULY 18, 2007

PREPARED STATEMENTS SUBMITTED FOR THE RECORD

JULY 18, 2007

Opening Remarks
Honorable Terry Everett
Ranking Member, Subcommittee on Strategic Forces
House Armed Services Committee

Hearing on U.S. Nuclear Weapons Policy
July 18, 2007

I thank my good friend, colleague, and Chairman for holding this important hearing. I also join her in welcoming our guests:

- Dr. William Perry;
- Dr. Sidney Drell; and
- Dr. Keith Payne.

We are fortunate to have assembled here this well-regarded and insightful panel of witnesses. We are equally fortunate as we have some of the most knowledgeable members of Congress on nuclear issues leading and sitting on this subcommittee.

There are three key questions that I believe frame our hearing today:

1) **What has changed in our security environment to drive the need for a change to our nuclear policy and strategy?**
2) **To what extent are the tenets and assumptions of the 2001 Nuclear Posture Review still valid and what has not been sufficiently addressed?**
3) **What implications would policy and strategy changes have on the composition and size of our nuclear weapons stockpile?**

This committee has significant decisions ahead of it on the Reliable Replacement Warhead (RRW) program and complex transformation, in particular. I don't expect these to be simple or easy. I hope we can foster a

discussion that places these decisions in the context of a policy framework that describes our nation's desired future stockpile and guides our investments in our nation's nuclear weapons complex and capabilities.

As the Chairman noted, our defense bill establishes a bi-partisan commission to assess our nation's strategic posture, including the role of nuclear weapons. I ask our witnesses to provide their insights and recommendations on the key questions and policy issues the commission should focus on.

Some of the key issues I remain focused on include:

<u>The utility of nuclear deterrence</u>. Some argue that the threats we now face do not lend themselves to deterrence by our nuclear weapons. Terrorists like al-Qaida and rogue nations such as Iran and North Korea

seek to acquire nuclear capabilities. Several other countries possess nuclear arsenals, with some undertaking modernization programs. In the past decade, North Korea, India and Pakistan have tested nuclear devices. The world is not a safer place, but we are beyond the point of putting the "genie back in the bottle." To what extent do our witnesses believe changes to U.S. nuclear policy can curb these activities? And to what extent might our nuclear capabilities adapt to these changing threats?

<u>Further reductions in our stockpile</u>. I'd like to believe we can go deeper, but to what level can we go and still maintain a credible nuclear deterrent? Current U.S. nuclear policy has led to significant stockpile reductions. In 2002, Presidents Bush and Putin in 2002 each agreed to further reduce operationally deployed warheads to

levels between 1,700 and 2,200 by 2012. Over its lifetime, Pantex has dismantled over tens of thousands of warheads. Can we make further reductions with the stockpile we have—relying on stockpile stewardship and LEPs to address what many see as an aging stockpile and weapons complex—or do we need different capabilities?

<u>The role of agreements and other initiatives</u>. Both unilateral and bi- or multi-lateral agreements have served as tools for stockpile reductions and non-proliferation. What mechanisms do our witnesses believe are most effective? With Cold War-driven agreements like START set to expire in the near-future, are there similar or alternative mechanisms for further reducing our active and reserve stockpiles?

<u>The role of "New Triad" capabilities</u>. The 2001

Nuclear Posture Review set forth a "new triad" strategy that further decreased our reliance on nuclear weapons but was based on a corresponding increase in defenses, such as our ballistic missile defense system, conventional strike capabilities like CTM, and a responsive infrastructure. I am interested in our witnesses' views on NPR implementation and how a new policy and strategy might echo or diverge from the NPR.

Lastly, the role of non-proliferation efforts. Nuclear non-proliferation should factor prominently into any future nuclear policy. But, to what extent are decisions on the future of the U.S. nuclear stockpile based on non-proliferation policy? Our nuclear umbrella provides assurances to friends and allies who might otherwise seek to develop nuclear weapons as a means of security against the threats I previously mentioned.

I'd like to conclude by commenting that this is not a debate, but rather a discussion. A debate implies two sides with two different positions. I do not believe we have two sides on this issue. We are all here today because we believe it is important to recognize the changes in our security environment and the future role nuclear weapons play in strengthening our security.

Thank you for taking time out of your busy schedules to be with us today. I look forward to your testimony.

I am grateful to the Chairman for calling this important and timely hearing and I yield back the balance of my time.

Testimony
House Armed Services Committee
Strategic Forces
Subcommittee

William J. Perry
July 18, 2007

The ending of the Cold War brought about enormous geopolitical changes, not all of which, as it turned out, were good. But it did bring about one positive change of enormous importance: it reduced to nearly zero the danger of a nuclear war resulting from a miscalculation. There still exists, however, the danger of nuclear war occurring by accident. Both American and Russian missiles remain in a launch-on-warning mode. And the inherent danger of this status is aggravated by the fact that the Russian warning system has deteriorated since the ending of the Cold War.

But the greatest danger today is that a terror group will detonate a nuclear bomb in one of our cities. Graham Allison, in his book, "Nuclear Terrorism", states that the likelihood of a nuclear bomb being detonated in one of our cities this decade is fifty percent. He makes a compelling argument that Al Qaeda and other terror groups are trying to get nuclear weapons. He also argues that if they get one, they will use it, with devastating results.

Of course, a nuclear detonation in one of our cities would not be equivalent to a nuclear exchange during the Cold War, which could have led to the extinction of civilization. But it still would be the worst catastrophe of our time. Just one primitive nuclear bomb based on the design of the Hiroshima bomb could result in more than a hundred thousand deaths, and there could be more than one bomb. The direct economic losses from the detonation would be hundreds of billions of dollars, but the indirect economic impact would be even greater, as worldwide financial markets collapsed in a way that would make the market setback after 9-11 seem mild. And the social and political effects are incalculable, especially if the nuclear bomb were to be detonated in Washington, disabling a significant part of our government.

So, almost twenty years after the ending of the Cold War, we still have a dark nuclear cloud hanging over our heads. As the Cold War was coming to an end, the presidents of the United States and the Soviet Union confronted this danger to civilization and sought to end it. They met in 1986 at Reykjavik and engaged in serious discussions on how to end the danger by bringing about an elimination of nuclear weapons. In the end, the two presidents were not able to reach agreement on the major steps they were discussing, and the Reykjavik meeting is considered by many to have been a failure.

Submitted 2 July, 2007

Last September, on the twentieth anniversary of the Reykjavik summit, George Shultz hosted a conference at Stanford to see what lessons we could learn from that remarkable meeting, where Presidents Reagan and Gorbachev seriously discussed eliminating not only nuclear weapons but also their delivery means. At our Stanford meeting, we concluded that the nuclear vision pursued by Reagan and Gorbachev at Reykjavik was valid and should be revived.

We put together the main ideas that came out of that meeting in an op-ed that was published by the Wall Street Journal. And this op-ed was signed by George Shultz, Sam Nunn, Henry Kissinger and myself, all of whom played a major role in sustaining our nuclear programs during the Cold War. It was followed in a few days by another op-ed from President Gorbachev who essentially endorsed the views we expressed.

Of course, we understood that it might be many decades before that nuclear vision could be realized. And that in the meantime, nuclear weapons continue to pose an existential threat to our nation and to civilization. Until nuclear weapons are eliminated, we should focus on steps to reduce their danger, or, to use the words of Sakharov, to reduce the risk of annihilating humanity. So we outlined in our op-ed a set of steps that could be taken now that would have the practical effect of greatly reducing that risk. I list in summary form some of the steps that should be considered.

- Increase warning time and thereby reduce the danger of an accidental use of a nuclear weapon
- Reduce substantially the size of nuclear forces in all states that possess them
- Eliminate short-range nuclear weapons designed to be forward-deployed
- Ratify the Comprehensive Test Ban Treaty
- Improve security for all stocks of weapons, weapons-usable plutonium, and highly enriched uranium everywhere in the world
- Get control of the uranium enrichment process
- Halt production of fissile material for weapons globally

These steps, besides moving us toward the goal of a world free from nuclear weapons, also protect us from the dangers of nuclear weapons until that goal is achieved. On the other hand, I believe that the programs now underway in the United States are inadequate to protect us from those dangers.

The centerpiece of our government's strategy for dealing with a nuclear attack is the National Missile Defense system now being installed in Alaska. That system has been criticized for being technically deficient on the basis of its test firings. But that is almost beside the point. Even if it worked exactly according to its specifications, it is simply irrelevant to the threat of nuclear terrorism. Terrorists would not use a ballistic missile to deliver their bomb; they would use a truck or a freighter. The mode of operation could be like the delivery of the truck bomb in Oklahoma City, but with the truck carrying a nuclear bomb instead of a few tons of explosives. So it seems all too clear that we can not deal with the danger of nuclear

terrorism by missile defense. Similarly, deterrence is not likely to be effective against a terror organization like Al Qaeda.

But there is some good news in this otherwise grim picture. No terror group is able to build a nuclear bomb from scratch; only a nation state can manage a project of that complexity. For a terror group to get a nuclear bomb, they must buy or steal one from a nuclear power, or with more difficulty, put one together from the plutonium or highly enriched uranium they acquire from a nuclear power. So the key to success is to keep them from getting the bomb or the fissile material in the first place.

The Proliferation Security Initiative was established a few years ago as a cooperative international program to interdict nuclear weapons or material being illegally transferred. This is a useful program in many respects, but we should never believe that it is likely to be successful in preventing a nuclear power from smuggling a bomb to a terror group. A "so-called" tactical bomb could be put in a suitcase. The plutonium need to make a bomb as destructive as the Hiroshima bomb is about the size of a grapefruit. There is no interdiction system that exists or that is conceivable that would have a good probability of stopping a clever smuggler from transferring either of these.

Our government's near-term strategy should be focused on programs designed to accomplish two objectives:

1. Reducing and protecting existing nuclear arsenals; and
2. Taking all feasible actions to keep new arsenals from being created.

Both of these objectives require a concerted effort on the part of our government, but neither can be fully successful without the cooperation of many other governments; most importantly, the cooperation of all other nuclear powers.

I will first describe the challenge of reducing and protecting existing nuclear arsenals. During my tenure as secretary of defense, I made that my top priority, using a program that had been inspired by two visionary senators, Sam Nunn and Dick Lugar. Our greatest success with the Nunn-Lugar program was in getting Ukraine, Kazakhstan, and Belarus to give up all of their nuclear weapons. And at the time we started this program, Ukraine was the third largest nuclear power in the world, with more nuclear weapons than China, England and France combined. At the same time, we took actions in cooperation with the Russian government to substantially improve the safeguards on nuclear weapons, material, and technology. The Bush administration has continued the Nunn-Lugar program, but has not made it a priority. It should be our top priority to strengthen the Nunn-Lugar program and extend it to include all nuclear powers and to deal with fissile materials associated with commercial power reactors.

The second challenge is to keep new nuclear arsenals from being created. During my tenure as secretary of defense, I must say that we failed to prevent India and Pakistan from building and deploying a nuclear arsenal (not from lack of trying), but did succeed in holding North Korea and Iran at bay. During the last six years both North

Korea and Iran have substantially advanced their nuclear weapon programs, even though the administration has stated that they considered such programs "unacceptable".

I believe that the administration's diplomacy has been hobbled by a policy of not talking to "evil" nations, which they have described as rewarding bad behavior. One can argue about the merit of that policy, but no one can argue about the results it has produced. During six years of the United States applying this theory, North Korea has built six to ten nuclear bombs, has tested one of them, and has tested a number of ballistic missiles.

But it appears that this policy is changing. The administration, in just the last few months, has authorized its ambassador to have direct talks with North Korea. This change of policy has led directly to a new agreement with North Korea. This agreement has a long way to go before it can be considered successful, but at least it is evidence that the administration has constructively changed its policy.

Beyond North Korea and Iran, there are several dozen countries that have the capability to build nuclear weapons in a year or two. These nations have voluntarily joined the Nuclear Non-Proliferation Treaty (NPT) and renounced the building of nuclear weapons. But this non-proliferation regime is exceedingly fragile. It is threatened today by the emergence of India and Pakistan as nuclear powers, and would be entirely undermined if North Korea and Iran are free to build nuclear arsenals.

But it also could be undermined by the policies of the two major nuclear powers, Russia and the United States. Russia has declared that, because of the weakness of its conventional military forces and because of the American deployment of a National Missile Defense System, it must depend more on nuclear weapons. They have renounced their previously stated "no first-use policy; they have re-MIRVed their old ICBMs; they have undertaken the development of new ICBMS; and they have maintained a large stock of tactical nuclear weapons.

The Bush administration, for its part, has requested Congressional authority to build new nuclear weapons, most notably the so-called "Bunker buster"; has not ratified the Comprehensive Test Ban Treaty (while still complying with it); and has requested the authority to build a "reliable replacement warhead".

The actions of the United States and Russia have weakened the NPT, which was already undermined by the nuclear programs of India and Pakistan, and was being further undermined by the emerging programs of North Korea and Iran. Any attempt to prevent a hemorrhage of proliferation requires all of the nuclear powers to act in concert, and in particular requires Russia and the United States to show leadership in complying with the requirement of the NPT for the nuclear powers to move towards nuclear disarmament.

Submitted 2 July, 2007

One specific question faced by this committee is whether to authorize the Reliable Replacement Warhead (RRW) program. There are two valid arguments for proceeding with the RRW program: that it will maintain the capability of our nuclear weapon designers, which will become important if we ever need to design more nuclear warheads; and that it allows the design of a warhead that cannot be detonated by a terror group even if they were able to get one. A countervailing argument is that if the United States proceeds to develop new nuclear warheads it will substantially undermine our ability to lead the international community in the fight against proliferation, which we are already in danger of losing.

My best subjective judgment is that the proliferation argument outweighs the other two. But I understand that we live in a very dangerous and uncertain world, and I firmly believe that we have to maintain an unequivocal deterrent capability for the foreseeable future. So my judgment would be different if I thought that our present nuclear force could not be maintained to provide that capability for many decades in the future.

On balance, I believe that we could defer action on the RRW program, and I have no doubt that this would put us in a stronger position to lead the international community in the continuing battle against nuclear proliferation, which threatens us all. And I believe that our best protection against nuclear terrorism is robust programs that keep nuclear weapons and fissile material out of the hands of terrorists.

Submitted 2 July, 2007

William J. Perry

William J. Perry, a senior fellow at the Hoover Institution, is the Michael and Barbara Berberian Professor at Stanford University, with a joint appointment in the School of Engineering and the Institute for International Studies, where he is codirector of the Preventive Defense Project, a research collaboration of Stanford and Harvard Universities. His previous academic experience includes professor (halftime) at Stanford from 1988 to 1993, when he was the codirector of the Center for International Security and Arms Control. He also served as a part-time lecturer in the Department of Mathematics at Santa Clara University from 1971 to 1977.

Perry was the nineteenth United States secretary of defense, serving from February 1994 to January 1997. His previous government experience was as deputy secretary of defense (1993–94) and undersecretary of defense for research and engineering (1977–81).

Perry's business experience includes serving as a laboratory director for General Telephone and Electronics (1954–64); founding and serving as the president of ESL (1964–77); executive vice-president of Hambrecht & Quist (1981–85); and founding and serving as the chairman of Technology Strategies and Alliances (1985–93). He serves on the board of directors of Anteon International Corporation and several emerging high-tech companies and is chairman of Global Technology Partners.

Perry was born October 11, 1927, in Vandergrift, Pennsylvania. He attended grade school and high school in Butler, Pennsylvania. He received his B.S. and M.S. degrees from Stanford University and his Ph.D. from Pennsylvania State, all in mathematics. He is a member of the National Academy of Engineering and a fellow of the American Academy of Arts and Sciences. From 1946 to 1947, Perry was an enlisted man in the Army Corps of Engineers and served in the Army of Occupation in Japan. He joined the Reserve Officer Training Corps in 1948 and was a second lieutenant in the army reserves from 1950 to 1955.

Perry has received numerous awards, including the Presidential Medal of Freedom (1997), the Department of Defense Distinguished Service Medal (1980 and again in 1981), and Outstanding Civilian Service Medals from the army (1962 and 1997), the air force (1997), the navy (1997), the Defense Intelligence Agency (1977 and 1997), the National Aeronautics and Space Administration (1981), and the coast guard (1997). He received the American Electronic Association's Medal of Achievement (1980), the Eisenhower Award (1996), the Marshall Award (1997), the Forrestal Medal (1994), and the Henry Stimson Medal (1994). The National Academy of Engineering selected him for the Arthur Bueche Medal (1996). He has been honored with awards from the enlisted personnel of the army, navy, and air force. Perry has received decorations from the governments of Germany, England, France, Korea, Albania, Poland, Ukraine, Bahrain, Slovenia, Hungary, and Japan.

HOUSE ARMED SERVICES COMMITTEE
STRATEGIC FORCES SUBCOMMITTEE
Testimony on U.S. Nuclear Weapons Policy
Sidney D. Drell
Stanford University
July 18, 2007

THE DANGER OF PROLIFERATION OF NUCLEAR WEAPONS

The existing international regime, grounded in the nuclear NonProliferation Treaty for preventing new nuclear weapon states, reducing existing nuclear arsenals, and controlling the spread of nuclear technology and material, is seriously endangered.

The inevitable spread of technology, particularly uranium enrichment and plutonium reprocessing technology for civilian energy, creates the danger of more states with nuclear arms and fissile material. In turn, it provides more opportunities for theft or sale to terrorist groups or other societal units unrestrained by accepted norms of civilized behavior, thereby increasing the risk that nuclear weapons will be used.

Beyond North Korea and Iran more than 40 nations already have taken substantial steps forward in nuclear technology. Even more have indicated interest in developing such technology for civilian power. And once you can enrich uranium for a civilian power reactor – you are well on the way. If we continue on the present course the United States and the world soon will be compelled to enter a new nuclear era that will be more precarious and economically costly than was Cold War deterrence.

REDUCING NUMBERS OF NUCLEAR WEAPONS

During the Cold War, nuclear weapons were essential to maintaining international security because they were a means of deterrence. Sixteen years ago the Cold War ended with the demise of the Soviet Union, and with it, the doctrine of mutual Soviet-American deterrence became obsolete. Deterrence continues to be a relevant consideration for many states with regard to threats from other states. But reliance on nuclear weapons for this purpose is becoming increasingly hazardous and decreasingly effective as the prospect of nuclear proliferation grows increasingly ominous. The time is overdue for a fresh look at the role of nuclear weapons in U.S. defense planning.

The United States and Russia have now officially adopted a policy of cooperation against the new threats, faced by both nations, of terrorists and unstable or irresponsible governments acquiring nuclear weapons. This replaces the former adversarial relationship of nuclear deterrence based on mutual assured destruction. As stated in the Joint Declaration of Presidents Bush and Putin on November 13, 2001: "The United States and Russia have overcome the legacy of the Cold War. Neither country regards the other as an enemy or threat." They emphasized that the two nations are allies working together against the spread of nuclear weapons in a "new strategic relationship.....that is cooperative rather than adversarial."

In light of this official change in policy, I have trouble understanding why we still seem to be planning under the Treaty of Moscow, or SORT, negotiated with Russia in 2002, for 1700 to 2200 deployed nuclear warheads in 2012, supplemented by several thousand more reserves in the stockpile. What are they for?

Potential targets in Russia, as described by the Department of Defense's 2001 Nuclear Posture Review, are "the instruments of political control and military power..., leadership and military capabilities, particularly weapons of mass destruction, military command facilities and other centers of control and infrastructure that support military forces." Their

total number is perhaps 200 to 300, assuming that Russia reduces its nuclear forces in parallel with the United States. Based on this estimate, and taking into account the new relationship with Russia that President Bush has proclaimed, a U.S. strategic force of some 500 operationally deployed strategic warheads would be more than adequate[1]. This number allows for force readiness concerns, multiple targeting where needed, and the possibility of very sudden and unexpected surprises from Russia, for example, a breakdown in its military command and control caused by technical failures or a takeover by renegades.

In order to provide a considerable degree of flexibility in a fluid security environment, as called for in the Nuclear Posture Review, the 500 operationally deployed strategic warheads would be augmented by a Responsive Force. These additional warheads would be configured in two parts, the first able to respond to a rapidly building crisis – a Ready Responsive Force – and the second able to respond to strategic warning signals on a timescale of a year or more – a Strategic Responsive Force. This use of the Responsive Force underscores the need for sustaining an infrastructure for supporting it, as well as the need to provide this force with appropriate hardening and concealment.

As we look ahead a few years into the future, the total Responsive Force should have 400 – 500 warheads, a number comparable to the operationally deployed one. This number would be adequate to target roughly several hundred additional Russian sites, for example, those affecting industrial recovery – the major nodes in the electric power grid and air, ground, and rail transportation systems, as well as major industrial sites. These targets and the forces to attack them may be viewed, we hope, as only temporary remnants of the Cold War policy of assured destruction that may be discarded before long in the dustbin of history.

In sizing our nuclear forces for the future, the United States and Russia, who presently possess more than 90% of the worldwide total of nuclear weapons, will have to enter into multilateral negotiations with the other nuclear weapon states as we make significant force reductions. The warhead numbers I have proposed above assume that such negotiations are successful in establishing nuclear restraint elsewhere in the world.

In making these reductions the United States should maintain the existing triad of strategic nuclear delivery systems—bombers plus land-based and sea-based ballistic missiles—to avoid common failure modes and vulnerabilities. There is value in retaining this diversity as the total stockpile is decreased as a way of preserving flexibility and confidence in reliability, so long as operational costs do not exceed their perceived value.

As Russia and the United States move farther away from the nuclear deterrence trap in which we are still ensnared, the sizing of our stockpiles would depend on other concerns and could be further reduced. In time, nuclear deterrence might be maintained entirely with a Responsive Force without an operationally deployed force. That Responsive Force could consist of considerably fewer than 1,000 warheads, perhaps no more than the 500 that are proposed initially to be in the operationally deployed force[2].

Moving ahead expeditiously with reductions in our strategic forces would help Russia and the United States work more cooperatively against the looming threat of nuclear weapons proliferation into dangerous hands. Bold actions by the two powers that still possess more than 90 percent of the world's nuclear warheads would be a powerful stimulus toward preserving and further strengthening a nonproliferation regime that is presently under severe strain, particularly, but not exclusively, from Iran and North Korea. In order to give

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[1] This discussion is based on a study by Sidney D. Drell and James E. Goodby: "What Are Nuclear Weapons For? Recommendations for Restructuring U.S. Strategic Nuclear Forces," (2005 report of the Arms Control Association)http://www.armscontrol.org/pdf/USNW_2005_Drell-Goodby.pdf

[2] A more comprehensive discussion of this issue is presented in Reference (1), which includes a notional force posture for illustrative purposes.

impetus to prospects for achieving further reductions in strategic nuclear forces below the levels outlined in SORT, the United States and Russia will have to negotiate an extension or revision of the formal provisions for verifying such measures that are currently slated to expire in December, 2009 with START. There is little time for delay in getting started on this effort.

MODERNIZATION AND RRW

Beyond numerical reductions in our nuclear forces, measures of restraint by the United States in managing and modernizing our nuclear arsenal will also be important to achieving success in meeting challenges to the nonproliferation regime.

If the US, the strongest nation in the world, were to conclude that it cannot protect its vital interests without relying on new nuclear weapons for new military missions, it would be a clear signal to other nations that nuclear weapons are valuable, even necessary, for their security. It would also be counter to the nonnuclear states' repeated urging that the nuclear states reduce reliance on nuclear weapons, reduce the numbers of weapons, and work toward ratifying the Comprehensive Test Ban Treaty. Indeed, at the United Nations in 1995, many nonnuclear nations set those terms as conditions for their agreeing to extend the NPT indefinitely.

Following the rejection of two programs for new bombs, a high-yield "bunker buster" and a low-yield new concepts warhead, Congress is considering the scope of a different program, the Reliable Replacement Warhead (RRW) program proposed by the Bush Administration. The RRW's stated purpose is to transform both the nuclear infrastructure and the nuclear weapons themselves so that the US can maintain long-term high confidence in its arsenal as it reduces the arsenal's size. The program's proponents state that the transformation will require a modernized infrastructure and new warhead designs.

The part of the RRW program that is directed at transforming the nuclear infrastructure is important and generally not controversial. The infrastructure needs serious attention. Much of it dates back to the beginning of the Cold War, or even to World War II. No matter how optimistic the nation's policymakers, scientists, and citizens, no matter how effective in the pace of reducing our arsenal, as long as the US has nuclear weapons it must be able to maintain confidence in the safety and reliability of the warheads in the shrinking stockpile. However, in planning a modernized nuclear complex that will be more efficient, flexible, and environmentally friendly to maintain, we need to decide first: How big an arsenal do we think we need? This will require developing an updated plan for the future U.S. nuclear policy and force posture as called for by this committee.

The more difficult and contentious part of the RRW program is the transformation of the current stockpile with newly designed warheads that will increase long-term reliability, safety, and use control – i.e. preventing our weapons from being exploded against us if they are acquired by terrorist actions. It is a daunting challenge to achieve these goals, all without resuming underground nuclear explosive tests in order to certify the newly designed warheads for deployment. Restrictions against resuming such tests have been imposed in legislation authorizing the RRW program. They are important to many nonnuclear nations around the world whose cooperation against nuclear proliferation the United States needs; and whose concerns about the seriousness of the nuclear powers' commitment to limiting their nuclear efforts in accord with the NonProliferation Treaty (NPT) cannot be ignored, denied or dismissed as irrelevant. Many nonnuclear states strongly registered such concerns in negotiations at the United Nations in 1995, when they agreed to continue the NPT indefinitely into the future. As a condition for their support, as I mentioned earlier, they called on the nuclear powers to ratify a CTBT and restrain our nuclear programs in order to

ameliorate the present discriminatory situation between the nuclear powers and the nonnuclear states who are proscribed by treaty from developing any nuclear forces.

We are faced with a key question: Can we achieve the goals of the RRW program without underground explosive testing? In developing its modern arsenal, the US has performed more than 1000 explosive tests over a period of 50 years. How confident could one be in certifying a new weapon that doesn't have a strong pedigree based on that nuclear test program? The ongoing vigorous and highly successful Stockpile Stewardship and Life Extension programs have established that the US stockpile of nuclear weapons is safe and reliable and does not show significant evidence of aging. And, in the context of those programs, the directors of Los Alamos, Lawrence Livermore, and Sandia National Laboratories, the three weapons labs, have, for the past decade, annually certified the stockpile to be safe and reliable. Those programs also include important improvements in nonnuclear components – for example, continually improving the safety of the arming, fusing, and firing system and enhancing performance margins.

I don't think that we presently know the answer to the key question I posed: we are not technically certain what aspects of an RRW program can be achieved without nuclear explosion testing. I do believe it is a worthwhile question to try to answer and a sensible approach to it should include the following three elements.

First, RRW needs to proceed carefully with research on design modifications before moving ahead to the development and manufacture of new warheads. Detailed analyses, subjected to independent scrutiny and rigorous peer review, will be needed to determine whether it is possible to build confidence and a strong technical consensus that the proposed changes are mutually compatible and have the appropriate test pedigree from previous work in developing the current stockpile. Before moving beyond the phase 2a, we must be able to convince ourselves that we will be able to place higher confidence in the reliability and effectiveness of new RRW designs, without underground explosive tests, than in our existing, well-tested warheads.

It would be an important action for the United States to strengthen the existing moratorium on underground nuclear tests by moving ahead to ratify the CTBT—a treaty that we were the first to sign in 1996 but have since failed to ratify. Such an action would strengthen our leadership role in strengthening the nonproliferation regime. But more than that, it would add an important technical strength to the ability to verify worldwide compliance with a ban on testing by bringing into force the full power of the International Monitoring System of hundreds of detection sensors around the world.

Second, we must recognize that implementing design changes is not time urgent – the legacy stockpile is strong. The pace of the work should not consume human and budgetary resources to the extent of savaging the important and highly successful Stockpile Stewardship and Life Extension programs.

Third, the government needs to be clear about the limited scope of the RRW program so as to avoid potentially harmful impacts on global nonproliferation efforts.

THE LONG TERM CHALLENGE

So far I have discussed the immediate challenge to prevent the proliferation of nuclear weapons from getting out of control. There is also a long term challenge that I would like to comment on briefly. It is the challenge to develop a strategy for removing the nuclear threat that hangs over our heads and achieving a world-free of nuclear weapons. That is a goal addressed by every American president since Dwight Eisenhower. It was the vision that President Reagan and General Secretary Gorbachev brought to their remarkable summit at Reykjavik in October, 1986, more than twenty years ago.

The challenge to rekindle the vision of Reykjavik, and to develop a strategy to realize it, was addressed at a conference that former Secretary of State George P. Shultz, who participated in that summit, and I organized last October at Stanford University's Hoover Institution. We reviewed the impact of Reykjavik and its relevance for today's world, and formulated a set of practical steps to define a path toward ridding the world of nuclear weapons.

The conclusions of the conference were summarized in an article, "A World Free of Nuclear Weapons," that appeared in the *Wall Street Journal* on 4 January 2007. The article was signed by Shultz, William Perry, Henry Kissinger, and Sam Nunn and endorsed by most of the conference participants, who also signed on to the article. First and foremost, the article emphasized the need for intensive work with leaders of the countries in possession of nuclear weapons, both to turn the goal of a world without nuclear weapons into a joint enterprise and to create a working mechanism for accomplishing that goal. Such a joint enterprise, by involving changes in the strategic assumptions and attitudes of the states possessing nuclear weapons, would lend additional weight to efforts already under way to avoid the emergence of a nuclear-armed North Korea or Iran.

The program developed at the Hoover Institution conference constitutes a series of urgent steps for which agreement should be sought. Such steps, as described[3] in the *Wall Street Journal* include:

- Changing the cold war posture of deployed nuclear weapons to Increase warning time and thereby reduce the danger of an accidental or unauthorized use of a nuclear weapon.
- Continuing to reduce substantially the size of nuclear forces in all states that possess them.
- Eliminating short-range nuclear weapons designed to be forward-deployed.
- Initiating a bipartisan process with the Senate, including understandings to increase confidence and provide for periodic review, to achieve ratification of the Comprehensive Test Ban Treaty, taking advantage of recent technical advances and working to secure ratification by other key states.
- Providing the highest possible standards of security for all stocks of weapons, weapons-usable plutonium, and highly enriched uranium everywhere in the world.
- Getting control of the uranium enrichment process, combined with the guarantee that uranium for nuclear power reactors could be obtained at a reasonable price, first from the Nuclear Suppliers Group and then from the International Atomic Energy Agency (IAEA) or other controlled international reserves. It will also be necessary to deal with proliferation issues presented by spent fuel from reactors producing electricity.
- Halting the production of fissile material for weapons globally; phasing out the use of highly enriched uranium in civil commerce and removing weapons-usable uranium from research facilities around the world and rendering the materials safe.
- Redoubling our efforts to resolve regional confrontations and conflicts that give rise to new nuclear powers.
- Addressing the requirements for effective measures to impede or counter any nuclear related conduct that is potentially threatening to the security of any state or peoples.

[3] See also Sidney D. Drell, "The Challenge of Nuclear Weapons" (Physics Today, vol. 60, no. 6, June, 2007)

Reassertion of the Reykjavik vision of a world free of nuclear weapons and practical measures toward achieving that goal could have a profoundly positive impact on the security of future generations. Without the bold vision, the actions will not be perceived as fair or urgent. Without the actions, the vision will not be perceived as realistic or possible.

Curriculum Vitae for Sidney D. Drell

Dr. Sidney Drell is a physicist and arms control specialist. Since 1960 he has been active in providing technical advice to the Government on national security issues, most recently as a member of the President's Foreign Intelligence Advisory Board. He currently serves as an External Governor on the Board of Governors of LANS-LLC, the management team created in 2006 for the Los Alamos National Laboratory, and is an active member of JASON.

Dr. Drell earned his B.A. degree from Princeton University, and his M.A. and Ph.D. degrees from the University of Illinois. A faculty member of Stanford University since 1956, he is currently Professor of Theoretical Physics (Emeritus) at the Stanford Linear Accelerator Center, (of which he was also Deputy Director until retiring in 1998), and a Senior Fellow at the Hoover Institution at Stanford.

Among many honors Dr. Drell received a MacArthur Foundation prize fellowship, the Enrico Fermi Award, and election to the National Academy of Sciences. He is a Fellow of the American Physical Society and served as its elected president in 1986.

In 2001 he was presented the National Intelligence Distinguished Service Medal, the highest award bestowed by the U.S. Intelligence Community. He is also one of 10 scientists honored by the U.S. National Reconnaissance Office as "Founders of national reconnaissance as a space discipline."

Dr. Drell co-authored a book with Ambassador James Goodby, "The Gravest Danger: Nuclear Weapons", published by the Hoover Institution Press in October, 2003. He also co-authored a report with Ambassador James Goodby, "What Are Nuclear Weapons For?" published in April 2005. In 2007 World Scientific Press (Singapore) published a selection of his papers on arms control with the title "Nuclear Weapons, Scientists, and the Post-Cold War Challenge."

On May 24, 2005 he was awarded the 11th annual Heinz Award for Public Policy, as a "tireless and effective spokesman and advisor to the United States government in efforts to reduce the danger and proliferation of nuclear weapons."

Disclosure

I have had no Federal Grants or Subgrants with the United States government during the past three years.

Testimony before the House Armed Services Committee
Subcommittee on Strategic Forces

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July 18, 2007

The rise of hostile rogue states, new terrorist threats, and the proliferation of WMD and missile technology have all highlighted our need for an effective deterrence strategy in this post-Cold War environment. The fundamental questions of strategy we now face are to understand what and how we may be able to deter in a *new* strategic environment.

Unfortunately, most of what we believed was true about deterrence during the Cold War is now misleading because international conditions have changed so dramatically. During the Cold War, deterrence typically was considered a relatively easy matter of posing a nuclear retaliatory threat to Soviet targets. Many U.S. officials and commentators mechanistically equated the certainty of deterrent effect with the U.S. nuclear capability necessary to threaten Soviet society with "Assured Destruction." The frequent Cold War promise was that deterrence would be "stable" if the United States deployed particular, "stabilizing" strategic forces.

That promise rings hollow in the contemporary threat context. The painful truth is that deterrence now is unpredictable regardless of the number and types of forces we may possess. Deterrence is beset by irreducible uncertainties: no one truly knows what now constitutes a "stabilizing" force structure, or whether or how deterrence will work across the wide spectrum of contemporary opponents, stakes and circumstances.

This conclusion does *not* suggest that we discard deterrence. It does, however, explain why our Cold War strategy of deterrence based on offensive nuclear forces and a mutual balance of terror must be reconsidered in toto.

Intelligence Dedicated to Deterrence Planning

One part of the answer to our contemporary strategy question of "how to deter" is tailored intelligence. To understand how best to deter in any contingency we need first to understand the specific opponent's mind-set and behavioral style, and the different ways opponents can perceive and respond to our deterrence threats. Deterrence now is first and foremost a matter of intelligence. It requires a much broader, dedicated intelligence effort for this purpose than was the case in past decades. A recent study published by the National Defense University lists some of the questions about opponents that must be

addressed for deterrence purposes, whether those opponents are states or terrorist organizations:[1]

- What are the nation's or group's values and priorities? How are these affected by its history and strategic culture?
- What are their objectives in the particular situation?
- What factors are likely to influence their decisionmaking?
- Who makes decisions, how does the leadership think, what is their view of the world and their experience with and view of the United States
- How do they calculate risks and gains?
- What do they believe their stakes to be in particular situations (stakes may vary depending on the scenario)?
- What is the likely credibility of U.S. deterrence options to this adversary – for both imposing cost and denying gains?
- How risk-taking – or risk-averse –is the leadership?
- How much latitude does the leadership have to either provoke or conciliate?
- What are their alternative courses of action?
- What do they believe the costs and benefits of restraint to be? Do they think they are worse off if they do not take the aggressive action? Do they see any positive benefits in not taking the action in question?
- What do they perceive as America's answers to the questions above – for example, U.S. objectives, stakes, or risk-taking propensity?

When deterrence is our goal, there is no substitute for understanding the specific how's and why's of opponents' decision making; we no longer can presume to know the boundaries of opponents' possible thinking and behavior. This is true whether we seek to deter the leadership of a state or a terrorist organization.

I should note in this regard that the frequently-heard assertion that terrorists must be undeterrable is mistaken. The historical record on terrorists, anarchists, and other violent, extremist groups is sufficient to conclude that they may be deterrable, depending on the context and circumstances—which is all that can be said of traditional state leaders. The

[1] Elaine Bunn, "Can Deterrence Be Tailored?" *Strategic Forum*, No. 225, Institute for National Strategic Studies, National Defense University (January 2007), p. 3.

question is whether we will understand terrorist opponents well enough to know *when* a strategy of deterrence is likely to be a useful tool, and if so *how* to employ it. In the absence of dedicated intelligence for this purpose, we will deter successfully only by luck. This again is true whether the opponent is a state or a terrorist organization.

Deterrence Forces

It is important to understand what types of U.S. deterrence threat will be best suited to deterring a particular opponent, in particular circumstances and for particular purposes. In some cases, *non-military* approaches to deterrence may deter best, in others, *non-nuclear force options* may be adequate and advantageous, in still other cases, *nuclear* threat options may be necessary to deter. Each type of capability is likely to have a role in deterring attacks; to reject any as unnecessary for deterrence is to presume knowledge about how foreign leaders will think and how deterrence will function across place and time that is wholly unsupportable.

For example, in some past cases, including the 1991 Gulf War, U.S. *nuclear* capabilities appear to have been essential to deterrence working to prevent war or the use of biological and chemical weapons. It would be extremely optimistic to believe that we will be so fortunate as not to confront similar cases in the future.

In his final speech to the U.S. Congress, Winston Churchill warned: "Be careful above all things not to let go of the atomic weapon until you are sure and more than sure that other means of preserving peace are in your hands!" There is no basis to conclude that those "other means" are at hand for our deterrence purposes. Occasionally it is suggested that our advanced conventional forces alone are adequate for deterrence. In fact, no one knows or can know whether that is true because deterrence depends on our opponents' judgements, and we simply do not know how contemporary and future opponents will calculate in this regard: to choose nuclear disarmament as the priority goal now would be to risk foregoing those U.S. forces that have served as decisive means of deterrence in the past.

Some see an incongruity in the U.S. maintaining a nuclear arsenal for deterrence while simultaneously advocating nuclear non-proliferation. I have heard this seeming incongruity likened to a drunkard advocating abstinence. In reality, this seeming incongruity is not hard to see through; indeed, the U.S. deployment of nuclear capabilities makes an essential contribution to nuclear non-proliferation. This positive linkage may be counterintuitive, but it is unquestionable.

How so? It is on the basis of the U.S. nuclear "umbrella" that allied countries such as Japan have chosen to remain non-nuclear: the continued credibility of our nuclear umbrella is critical to their decisions to remain non-nuclear, and their decisions to remain non-nuclear have been and continue to be critical to non-proliferation. It is hard to imagine a greater stimulus to nuclear proliferation than decisions by U.S. allies and friends to "go nuclear" themselves as a result of their loss of confidence in the U.S. nuclear umbrella. A detailed review of specific countries by noted regional experts

reaches a similar conclusion: "The case studies suggest that the perceived reliability of U.S. security assurances will be a critical factor, if not *the* critical factor, in whether such countries as Japan, Saudi Arabia, South Korea, Taiwan, and Turkey reconsider their nuclear options."[2]

The contemporary environment is increasingly challenging in this regard. North Korean and Iranian aspirations for nuclear weapons pose unprecedented nuclear threats to allies traditionally covered by the nuclear umbrella. Their responses to these emerging nuclear threats have highlighted the continuing critical role the U.S. extended nuclear deterrent plays in non-proliferation. For example, a 2006 Japanese study headed by former Prime Minister Nakasone concluded that "In order to prepare for drastic changes in the international situation in the future, a thorough study of the nuclear issue should be conducted." Mr. Nakasone noted that Japanese security is dependent on U.S. nuclear weapons, but that the future of the U.S. extended deterrent is unclear.

Since the North Korean testing of nuclear weapons in 2006, there have been numerous and once-unthinkable statements by Japanese officials that *Japan would be forced to reconsider its non-nuclear status in the absence of the U.S. nuclear umbrella*. For example, remarks by then-Director General of the Japanese Defense Agency, Akio Kyuma reflected the theme of a potential Japanese interest in nuclear weapons, and the reassurance provided by U.S. nuclear capabilities: "Japan should have a nuclear deterrent capability. Yet, Japan is not allowed to possess nuclear arms; on the other hand, the United States has them."

Similarly, former South Korean defense ministers recently asked that U.S. nuclear weapons removed from South Korea in 1991 be returned, and public sentiment has turned strongly in favor of South Korea having a nuclear weapons capability.[3] A recent South Korean delegation to the United States, led by Defense Minister Yoon Kwang-ung, sought an explicit U.S. public declaration that if North Korea employed nuclear weapons against South Korea, the United States would respond in kind as if the United States itself had been attacked.

Our extended deterrent is perhaps the single most important and least recognized nuclear non-proliferation tool in existence. As various new domestic initiatives for U.S. nuclear disarmament emerge, we need to recall Churchill's warning and be conscious of the potential severe downsides of such initiatives for deterrence, extended deterrence, and nuclear non-proliferation.

It is in this contemporary context that the Reliable Replacement Warhead (RRW) program is of potential value for the following basic reasons: it may contribute to sustaining a U.S. nuclear arsenal with increased warhead safety and security measures—

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[2] Kurt Campbell, Robert Einhorn, and Mitchell Reiss, *The Nuclear Tipping Point* (Washington, D.C.: Brookings Institution Press, 2004), p. 321.

[3] See respectively, Dana Linzer and Walter Pincus, "U.S. Detects Signs of Radiation Consistent With Test," *The Washington Post*, October 14, 2006, p. A14; and, Reuters, "S. Koreans want nuclear weapons due to North—survey," October 12, 2006, available at, http://asia.news.yahoo.com/061012/3/2r7t9.html.

without testing; it could help preserve the special skills and expertise necessary to maintain the U.S. capability to develop and produce nuclear weapons, and modernize portions of the industrial infrastructure necessary for that purpose; and, it could contribute to the prudent reduction of the nuclear stockpile. Because the retention of U.S. nuclear capabilities is important for U.S. deterrence and extended deterrence purposes, each of these possible benefits of RRW is potentially important.

Although still widely misunderstood, the Bush Administration's 2001 Nuclear Posture Review (NPR)—consistent with President Bush's May 1, 2001 mandate—sought to minimize U.S. reliance on nuclear weapons. It concluded that the immediate requirement for U.S. nuclear weapons could be met with far fewer deployed nuclear weapons, and that U.S. nuclear requirements could recede further as advanced non-nuclear weapons and defenses mature. That conclusion was a basis for the 2002 Moscow Treaty's agreed two-thirds reduction of deployed strategic nuclear weapons.

The NPR also emphasized that nuclear weapons alone are *not sufficient* for a strategy of deterrence. It identified the need for a much broader range of deterrent threat options than we inherited from the Cold War, particularly including *non-nuclear* options. The reasoning is straightforward: in many prospective post-Cold War contingencies, U.S. nuclear threats may be incredible for U.S. deterrence purposes. In some cases, strategic conventional weapons may be key. The U.S. capability to strike with non-nuclear weapons against high value or fleeting targets at global ranges could contribute significantly to deterrence, the assurance of allies, and directly to counterproliferation.

Unfortunately, progress toward non-nuclear strategic capabilities has been slow; now, almost six years after the 2001 NPR, nuclear-armed missiles remain the *only* prompt, U.S. global strike options available. I agree strongly with General Cartwright that it is important to move forward on a conventional capability for prompt global strike, Conventional Trident being the near-term option.

U.S. Defensive Capabilities and Deterrence Uncertainty

The contemporary uncertainty of deterrence vis-à-vis multiple new threats compels a review of Cold War strategy choices with regard to the role and value of active and passive defenses such as air defense, civil defense and ballistic missile defense (BMD). It may be recalled that in a *reversal* of the Johnson Administration's deterrence strategy, the Nixon Administration pursued a strategy of intentional U.S. societal vulnerability to virtually *any* strategic threat; it did so in deference to a balance of terror deterrence strategy with the Soviet Union. That Nixon Administration strategy and its subsequent perpetuation led to the continued limitation or further degradation of U.S. air defense, civil defense and ballistic missile throughout the remainder of the Cold War years and after.

Such strategy decisions have consequences—as was amply demonstrated on September 11, 2001 when the U.S. could muster only a single handful of air defense interceptors for

the defense of the entire Northeastern portion of United States, two of which apparently were unarmed. According to *The 9/11 Commission Report*, this lack of U.S. air defense capabilities, "...led some NORAD commanders to worry that NORAD was not postured to protect the United States." This vulnerability, however, should have come as no surprise: decades before the U.S. government consciously chose as a matter of strategy to leave largely uncontested the vulnerability of U.S. society to air and missile attack. In fact, during the Cold War, U.S. strategic air defense was reduced to being described officially and with no intended irony as being capable of limited control of U.S. airspace *in peacetime*.

In the contemporary environment of multiple WMD threats and deterrence uncertainty, it is critical that the U.S. approach to deterrence strategy include rather than eschew defensive capabilities. A balance of terror will provide no predictable protection against perplexing leaders such as North Korea's Kim Jong Il or Iran's President Ahmadinejad. It would be highly imprudent now to perpetuate the Cold War strategy choice of essentially unchallenged societal vulnerability when a good measure of protection is feasible in many plausible cases. As WMD threats multiply and deterrence becomes increasingly unpredictable, U.S. defensive capabilities must take on a new, higher priority.

Why so? Because we can no longer rely on deterrence working reliably to prevent strategic attack as we did during the Cold War. Deterrence can and likely will fail unpredictably in the future, as it has in the past. In those instances it will be important to limit damage to our society and economic infrastructure to the extent possible. This is one reason why various forms of strategic defense and damage-mitigations measures against mass destruction attacks are now so important, particularly including defenses against limited biological and nuclear attacks.

President Bush's 2002 decision to deploy strategic BMD against limited offensive missile threats reflected a partial reversal of the Nixon Administration's Cold War choice to eschew most forms of defense in favor of the intentional vulnerability of a balance of terror deterrence strategy. Much more remains to be done in this regard.

Particularly apparent is the need to deploy regional and strategic missile defense capabilities that are sufficiently timely, adaptable and global to meet emerging missile threats. With regional rogue states moving toward nuclear weapons and missiles of increasing range and payload, layered missile defense has become an essential element of U.S. post-Cold War strategy.

Promptly moving to counter the emerging Iranian missile threat, for example, is important to our key strategic goals of assuring allies, deterring attack, protecting against attacks that are not reliably deterrable, and possibly dissuading Iran from continuing to invest heavily in missiles as its favored delivery platform. It should be noted in this regard that these goals for U.S. BMD are not new. In the late 1960s the Johnson Administration identified the same set of objectives for its planned defense against Chinese strategic missiles—a program that remained in train until withdrawn in 1969 by the Nixon Administration.

Conclusion

The broad outlines of a U.S. post-Cold War deterrence strategy are apparent and reflect both continuities and discontinuities from past strategy and practice. Nuclear deterrence and extended nuclear deterrence remain important, with U.S. extended nuclear deterrence now playing a particularly critical role in non-proliferation. As emphasized in the NPR, the number of U.S. nuclear weapons can be lowered prudently, and the value of non-nuclear strategic forces and damage-limiting capabilities has ascended. Once we establish a political consensus on the "how's and why's" of U.S. post-Cold War deterrence strategy, I am confident that we will correspondingly pursue force development and deployment consistent with our strategy. We generally did so throughout the Cold War. We have yet to establish that post-Cold War strategy consensus and need to get on with the task.

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In 2002 and 2003, Dr. Payne served in the Department of Defense as the Deputy Assistant Secretary of Defense for Forces Policy. He received the Distinguished Public Service Medal from Secretary of Defense Rumsfeld, and the Forces Policy office Dr. Payne led received a Joint Meritorious Unit Award.

Dr. Payne is the editor-in-chief of *Comparative Strategy: An International Journal*, Chairman of the Strategic Command's Senior Advisory Group Policy Panel, co-chair of the U.S. Nuclear Strategy Forum, and a member of the State Department's International Security Advisory Board.

Dr. Payne is the author, co-author, or editor of over ninety published articles and sixteen books. His forthcoming book entitled *On Deterrence and Defense After the Cold War* (National Institute Press™), will be published in the fall of 2007.

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.

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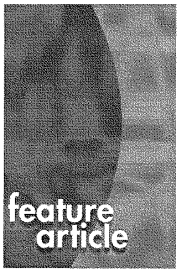

The challenge of nuclear weapons

Sidney D. Drell

To address the nuclear threat, argues the author, we will need to confront the reality of today's nuclear stockpiles and work to create a future without nuclear weapons.

Sid Drell is an emeritus professor of physics and emeritus deputy director of SLAC at Stanford University in Stanford, California, and a senior fellow at the university's Hoover Institution on War, Revolution, and Peace. He is also a long-term adviser to the US government on technical issues of national security and an active member of JASON.

We are on the precipice of a new and perilous nuclear era. The existing international regime is grounded in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which entered into force in 1970, for preventing new nuclear weapon states, reducing existing nuclear arsenals, and controlling the spread of nuclear technology and material.[1] That regime is in serious jeopardy.

The spread of technology creates the danger of additional states with nuclear arms and fissile material. Of particular concern are uranium enrichment and plutonium reprocessing technologies used for civilian energy. Such technologies provide opportunities for theft or sale to terrorist groups or other factions unrestrained by accepted norms of behavior, and so further increase the risk that nuclear weapons will be used.

In addition to North Korea and Iran, more than 40 nations have taken substantial steps forward in nuclear technology. Others have indicated interest in developing such technology for civilian power. And once a nation can enrich uranium for a civilian power reactor, it is well on the way to nuclear weapons. Without a change of course, the US and the world will soon be compelled to enter a new nuclear era that will be more precarious and economically costly than the period of cold war deterrence.

Bloated arsenals

During the cold war, nuclear weapons were essential to maintaining international security because they were a means of deterrence. Mutual Soviet–American deterrence was based on the realizations that a war with modern nuclear weapons would cause death and destruction on a terrifying and unprecedented scale and that no practical means afforded protection from devastating retaliation. War with nuclear weapons had become, in the words of President Dwight D. Eisenhower, "destruction of the enemy and suicide." Sixteen years ago, when the cold war ended with the demise of the Soviet Union, the doctrine of mutual Soviet–American deterrence became obsolete. Deterrence continues to be relevant for many states faced with threats from other states. But as the prospect of nuclear proliferation grows increasingly ominous, reliance on nuclear weapons for deterrence is becoming increasingly hazardous and decreasingly effective.

Nevertheless, US and Russian nuclear stockpiles remain bloated. In 2012, more than 20 years after the collapse of the Soviet Union, both the US and Russia will still have approximately 5000 nuclear warheads in their arsenals. Nearly 2000 of those will be deployed on ballistic missiles, many on hair-trigger alert, which presents unnecessary risk of an accidental or unauthorized launch. Why are these two nations retaining such large nuclear arsenals? What are the weapons for?

The current situation presents two major challenges—and opportunities. The first is to develop a strategy for dealing with the world as it is today, starting with steps to prevent the further spread of nuclear weapons. The second is to rekindle a bold vision that US President Ronald Reagan and the Soviet Union's General Secretary Mikhail Gorbachev brought to their remarkable summit meeting 20 years ago in Reykjavík, Iceland—a world freed of the nuclear sword of Damocles—and to develop a working strategy to achieve that vision.

Reagan and Gorbachev met at a moment of great stress following the breakdown of American–Soviet nuclear talks and the insertion of intermediate-range nuclear force (INF) missiles confronting one another in Europe. The two leaders came tantalizingly close to a formal commitment and schedule for getting rid of all nuclear weapons (see the box on page 56). Although they failed in the end, they did succeed in turning the arms race on its head. They initiated steps leading to significant reductions in deployed long-range nuclear forces and to the elimination of an entire class of threat—the INF missiles in Europe.

Can we rekindle their vision? Can we escape from the nuclear deterrence trap before it is too late? Or, in the words of Max Kampelman, former chief US negotiator with the Soviet Union and counselor of the US Department of State, "Can we change the world from what it *is* to what it *ought* to be?"

To face the first challenge and deal with the world as is, the international community must save and strengthen the nonproliferation regime based on the NPT. In view of the continuing spread of nuclear weapons technology, the NPT will need to be supplemented with intrusive new inspection rights for monitoring compliance with treaty provisions and for detecting covert efforts by a would-be proliferator to evade those provisions. Important agreements have already

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President Ronald Reagan (right) and General Secretary Mikhail Gorbachev meet at Hofdi House during the 1986 Reykjavik summit. (Courtesy of Ronald Reagan Library.)

been reached to bring such cooperative-inspection rights into practice. They include the Proliferation Security Initiative, a cooperative effort by nations to enforce export controls, interdict illegal transfers, tighten border controls, and prosecute violators.[2] The authority of the International Atomic Energy Agency (IAEA) is also being expanded under the Additional Protocol[3] to include on-site challenge inspections of undeclared and suspect activities. In the past, authority under NPT provisions limited inspections to the declared peaceful nuclear activities of the signatory nations.

Of course, the most direct way for states or terrorist entities to acquire nuclear weapons is to steal or illegally purchase them—a real danger. The best means of denying them a nuclear capability is to provide maximum protection for existing stockpiles of weapons and nuclear materials and to reduce stockpile size. The highly successful Cooperative Threat Reduction (CTR) program, also known as Nunn–Lugar after the US senators who proposed it in 1991, has provided security for a large share of the extensive nuclear material in the former Soviet Union.[4] Efforts are under way to extend cooperative threat reduction globally.

Implementation of security measures presents major diplomatic and intelligence challenges. Ultimately, success will depend on achieving broad cooperation with the nonnuclear weapons states, whose national security and economic concerns must also be addressed. That means offering them benefits to offset their motivations for joining the nuclear club and to help persuade them to accept more intrusive inspections. One important incentive will be a guarantee of secure energy sources, nuclear or otherwise, to nonnuclear countries willing to forgo constructing their own nuclear enrichment and reprocessing facilities. Toward that end the US, Russia, and the IAEA have individually made important proposals, common in purpose but differing in details. All would create a mechanism to guarantee the provision of uranium fuel for operating reactors for civilian power and research; the fuel would remain under agreed safeguards.

Bunker busters and other new designs

One need not look abroad for challenges to the present nonproliferation regime. It suffices to look toward Washington and recent US proposals to develop new nuclear weapons designs. The Department of Defense's Nuclear Posture Review[5] of December 2001 highlighted a need for new high-yield, earth-penetrating nuclear weapons—the so-called bunker busters. Their purpose was to defeat growing threats of hardened and deeply buried underground targets of military interest being built in many countries. (See PHYSICS TODAY, May 2003, page 27 and the article by Robert Nelson, November 2003, page 32.) The design and production of very-low-yield, new-concept weapons was also proposed for attacking shallow underground military targets. These designs were put forward as causing less damage, and therefore being "more usable," particularly against targets that contain biological or chemical warfare agents that, it was alleged, could be destroyed without being dispersed.

Those proposals for developing and deploying new weapons went through several years of heated debate in Congress before being rejected in separate actions during the past three years. Rejection was based on a judgment that benefited from careful, detailed, independent technical analyses: The new weapons' potential military value was marginal and less compelling than their likely harmful impact on the nonproliferation regime and the nation's security.

The congressional action was also a ringing rejection of the dangerous notion that a nuclear weapon is more usable if its collateral damage is reduced. No matter how small a nuclear payload is, using it would be a most fateful decision.

We would be crossing a very dangerous threshold.

If the US, the strongest nation in the world, were to conclude that it cannot protect its vital interests without relying on new nuclear weapons for new military missions, it would be a clear signal to other nations that nuclear weapons are valuable, even necessary, for their security. It would also be counter to the nonnuclear states' repeated urging that the nuclear states reduce reliance on nuclear weapons, reduce the numbers of weapons, and work toward ratifying the Comprehensive Test Ban Treaty (CTBT; see reference 6 and the article by Jeremiah Sullivan, PHYSICS TODAY, March 1998, page 24). Indeed, at the United Nations in 1995, many nonnuclear nations set those terms as conditions for their agreeing to extend the NPT indefinitely.

Following the rejection of the two programs for new bombs, the Bush administration and Congress are considering the scope of a different program, the Reliable Replacement Warhead program (see PHYSICS TODAY, February 2007, page 24, and the news story on page 35 of this issue). The RRW's stated purpose is to transform both the nuclear infrastructure and the nuclear weapons themselves so that the US can maintain long-term high confidence in its arsenal as it reduces the arsenal's size. The program's proponents allege that the transformation will require a modernized infrastructure and new warhead designs that will increase long-term reliability, safety, and use control—protection from weapons being exploded against us if they are acquired by terrorist actions—without requiring a resumption of nuclear testing.

What are nuclear weapons for?

The part of the RRW program that is directed at transforming the nuclear infrastructure is important and generally not controversial. The infrastructure needs serious attention. Much of it dates back to the beginning of the cold war, or even to World War II. No matter how optimistic the nation's policymakers, scientists, and citizens, no matter how effective in the pace of reducing our arsenal, as long as the US has nuclear weapons it must be able to maintain confidence in the safety and reliability of the warheads in the shrinking stockpile.

However, in planning a modernized nuclear complex that will be more efficient, flexible, and environmentally friendly, we need to answer the questions, What are our nuclear weapons for? How big an arsenal do we want, or think we need? In November 2001 Presidents George W. Bush and Vladimir Putin issued a joint statement asserting as a fact, not merely an aspiration, that "the United States and Russia have overcome the legacy of the Cold War. Neither country regards the other as an enemy or threat." They emphasized that the two nations are allies working together against the spread of nuclear weapons in a "new strategic relationship that is cooperative rather than adversarial."

In light of those official policy statements, I have trouble understanding why we still seem to be planning for 1700 to 2200 deployed nuclear warheads in 2012, backed by some 3000 more reserves in the stockpile. What are they for? Potential targets in Russia, as described by the Nuclear Posture Review,[5] are "the instruments of political control and military power . . . , leadership and military capabilities, particularly weapons of mass destruction, military command facilities and other centers of control and infrastructure that support military forces." An estimated total number of such targets[7] is between 200 and 300, a figure considerably larger than in any other nation with nuclear weapons or any potential nuclear enemy. One might conclude that an appropriate planning number for the size of our arsenal would be roughly an order of magnitude smaller than the current total of about 5000.

Nuclear disarmament considered at Reykjavik

The following text is from the official US transcript of the Reykjavik summit's final session, held the afternoon of 12 October 1986. My comments are interspersed in italics. The excerpt begins with President Ronald Reagan addressing General Secretary Mikhail Gorbachev.

The USSR and the United States undertake for ten years not to exercise their existing right of withdrawal from the ABM *[Antiballistic Missile]* Treaty, which is of unlimited duration, and during that period strictly to observe all its provisions, while continuing research, development and testing which is permitted by the ABM Treaty. Within the first five years of the ten-year period (and thus through 1991), the strategic offensive arms of the two sides shall be reduced by 50 percent. During the following five years of that period, the remaining 50 percent of the two sides' offensive ballistic missiles shall be reduced. Thus by the end of 1996, all offensive ballistic missiles of the USSR and the United States will have been totally eliminated.

Subsequently there was discussion about what activities were allowed under the ABM Treaty and also clarification as to what offensive missiles were included in the second 5 years of the 10-year reduction period. That led to the following.

The President agreed this could be sorted out. He asked whether Gorbachev was saying that beginning in the first five-year period and then going on in the second we would be reducing all nuclear weapons—cruise missiles, battle field weapons, sub-launched and the like. It would be fine with him if we eliminated all nuclear weapons.

Gorbachev said we can do that. We can eliminate them.

The Secretary *[George Shultz]* said, "Let's do it."

The disagreement over limitations on ABM research, development, and testing—in particular, whether it be restricted to the "laboratories," a term never clearly defined at Reykjavik—led to the failure to reach agreement.

The more difficult and contentious part of the RRW program is the transformation of the current stockpile with newly designed warheads. The stated goal of increasing confidence in the arsenal and its long-term safety, reliability, and use control faces the daunting technical challenge of specific limitations imposed by the legislation authorizing the program. New weapons for new military missions may not be developed, and underground test explosions must not be required in order to certify the new designs.

The key question is, Can we achieve the goals of the RRW program without underground explosive testing? In developing its modern arsenal, the US has performed more than 1000 explosive tests over a period of 50 years. How confident could one be in certifying a new weapon that doesn't have a strong pedigree based on that nuclear test program? The ongoing vigorous and successful Stockpile Stewardship and Life Extension programs have established that the US stockpile of so-called legacy weapons is safe and reliable and does not show significant evidence of aging (see reference 8 and the article by Raymond Jeanloz, PHYSICS TODAY, December 2000, page 44). And, in the context of those programs, the directors of Los Alamos, Lawrence Livermore, and Sandia National Laboratories, the three weapons labs, have, for the past decade, annually certified the stockpile to be safe and reliable. Those programs also include important improvements in nonnuclear components—for example, continually im-

George Shultz, former secretary of state, participated in the Reykjavík summit, during which President Ronald Reagan and General Secretary Mikhail Gorbachev came tantalizingly close to agreeing to eliminate their nuclear weapons. He is now the Thomas W. and Susan B. Ford Distinguished Fellow at Stanford University's Hoover Institution on War, Revolution, and Peace.

proving the safety of the arming, fusing, and firing system and enhancing performance margins.

I don't think that we presently know the answer to the key question I posed. I do believe it is a worthwhile question to try to answer, and a sensible approach to it should include the following three elements.

First, the nation needs to proceed carefully with research on modifications or a new warhead design before moving to the development and manufacture of new warheads. Detailed analyses, subjected to independent scrutiny, will be needed to determine whether it is possible to build confidence and a strong technical consensus that the proposed changes are mutually compatible and have the appropriate test pedigree from previous work in developing the current stockpile. It is not a question of the individual components working but of the system—in fact a system of systems—being reliable.

Second, we must recognize that implementing changes is not urgent—the legacy stockpile is strong. The pace of the work should not consume human and budgetary resources to the extent of savaging the important and highly successful Stockpile Stewardship and Life Extension programs.

Third, let's be clear about the limited scope of what we are doing so as to avoid potentially harmful impacts on the nonproliferation goals here and globally. The US needs the cooperation of the many nonnuclear states, whose concerns about the seriousness of the nuclear powers' commitment to limiting their nuclear efforts in accord with the NPT cannot be ignored, denied, or dismissed as irrelevant. Many nonnuclear states strongly registered such concerns in negotiations at the United Nations in 1995, when they agreed to continue the NPT indefinitely into the future. They called on the nuclear powers to ratify a CTBT and restrain their nuclear programs in order to ameliorate the present discriminatory situation between the nuclear powers and the nonnuclear states who are restrained by treaty from developing any nuclear forces.

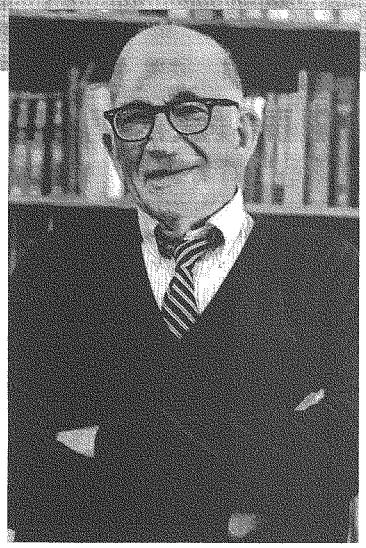
The Reykjavík vision

Turning to the second challenge mentioned earlier, beyond the immediate challenge to prevent proliferation from getting out of control, we need to re-create the Reykjavík vision for escaping the nuclear deterrence trap and removing the nuclear threat that still hangs over our heads.

US leaders have addressed this challenge in earlier times. In his "Atoms for Peace" address to the United Nations in 1953, President Eisenhower pledged the US's "determination to help solve the fearful atomic dilemma—to devote its entire heart and mind to find the way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life."

President John F. Kennedy, seeking to break the logjam on nuclear disarmament in the early 1960s, said, "The world was not meant to be a prison in which man awaits his execution." President Reagan called for the abolishment of "all nuclear weapons," which he considered to be "totally irrational, totally inhumane, good for nothing but killing, possibly destructive of life on Earth and civilization." Reagan was a true nuclear abolitionist. Gorbachev shared his vision, and the two men strove to realize it in their remarkable Reykjavík meeting more than 20 years ago. Their vision to eliminate all nuclear weapons shocked experts in the doctrine of nuclear deterrence but galvanized the hopes of people around the world. The leaders of the two countries with the largest nuclear arsenals had discussed the abolition of their most powerful weapons.

The entrenched nuclear orthodoxy responded very negatively to the Reykjavík vision. Former president Richard Nixon said, "No summit since Yalta has threatened western interests so much as at the two days at Reykjavík," and former secretary of defense James Schlesinger called Reykjavík "a near disaster from which we were fortunate to escape." Many in the arms control community also registered opposition, as did national leaders and analysts who, during the cold war years, claimed that efforts to zero out nukes were pie-in-the-sky impractical and would divert, if not obstruct, efforts for step-by-step arms control. Thinking out of the box inevitably causes such repercussions. Reagan, however, wrote in his memoirs that "Reykjavík was a major turning point in the quest for a safe and secure world." Similarly, one year after the summit, Gorbachev wrote that it "marked a turning point in world history. . . . It tangibly demonstrated that the world situation could be improved. . . . At Reykjavík we became convinced that our course was correct and that a new constructive way of political thinking was essential." Whatever its proponents and detractors may have thought, the summit certainly was,



Sidney Drell, along with George Shultz, organized the October 2006 conference at the Hoover Institution devoted to the nuclear-disarmament vision of Reykjavík.

as Reagan's secretary of state George Shultz said, "the highest-stakes poker game ever played."

What should be done?

The challenge to rekindle the vision of Reykjavík and to develop a strategy to realize it was addressed at a conference that Shultz, who participated at the summit, and I organized last October at Stanford University's Hoover Institution on War, Revolution, and Peace; the gathering marked the 20th anniversary of that remarkable meeting.[9] Conference participants reviewed the impact of Reykjavík and its relevance for today's world. And we formulated a set of practical steps to define a path for ridding the world of nuclear weapons.

The conclusions of the conference were summarized in an article, "A World Free of Nuclear Weapons," that appeared in the *Wall Street Journal* on 4 January 2007. The article was signed by Shultz, William Perry, Henry Kissinger, and Sam Nunn and endorsed by most of the conference participants, who also signed on to the article. First and foremost, the article emphasized the need for intensive work with leaders of the countries in possession of nuclear weapons, both to turn the goal of a world without nuclear weapons into a joint enterprise and to create a working mechanism for accomplishing that goal. Such a joint enterprise, by involving changes in the strategic assumptions and attitudes of the states possessing nuclear weapons, would lend additional weight to efforts already under way to avoid the emergence of a nuclear-armed North Korea or Iran.

The program developed at the Hoover Institution conference constitutes a series of urgent steps for which agreement should be sought. They require both political and technical progress and would reduce nuclear danger and lay the groundwork for a world free of the nuclear threat. Such steps, as described in the WSJ article, include

▶ *Changing the cold war posture of deployed nuclear weapons to increase warning time and thereby reduce the danger of an accidental or unauthorized use of a nuclear weapon.*

What actions can be taken to increase warning time and reduce the number of operationally deployed nuclear weapons that have procedures in place for a prompt launch?

▶ *Continuing to reduce substantially the size of nuclear forces in all states that possess them.*

This calls for a review of the role of nuclear weapons in the post–cold war world, particularly to address how many deployed and reserve warheads and delivery systems are needed. Can we move to a force structure consisting exclusively of responsive forces that can be activated as required during a time of rising tension? Reductions would necessarily start with Russia and the US, who possess more than 90% of all nuclear weapons. What rate of reduction is practical, and to what extent will reductions require coordinated actions and negotiated agreements among all the nuclear powers? What monitoring and verification tasks will need to be accomplished to support reductions?

▶ *Eliminating short-range nuclear weapons designed to be forward deployed.*

Beginning with US and Russian forces, these weapons should be repositioned for maximal safety and security as rapidly as is practical while verifiable protocols for their elimination are worked out. As a first step, Russia and the US should negotiate more transparency, in particular to include an exchange of data concerning short-range nuclear weapons. Further, they should agree on basic standards for protecting such weapons from illicit transfer.

▶ *Initiating a bipartisan process with the Senate, including understandings to increase confidence and provide for periodic review, to achieve ratification of the Comprehensive Test Ban Treaty, taking advantage of recent technical advances, and working to secure ratification by other key states.*

During the past decade, the US has maintained a safe and reliable nuclear deterrent with its aggressive Stockpile Stewardship and Life Extension programs; it has not had to rely on underground explosive tests. Recent advances in surveillance, computer simulations, and instrumentation for analyzing aboveground experiments on weapons' subsystems have enhanced our understanding of nuclear-explosion science. They have also increased confidence that we will see any evidence of significant aging and be able to respond so as to maintain confidence in the reliability, safety, and effectiveness of our weapons. Further diagnostic tools, such as the National Ignition Facility nearing completion at Lawrence Livermore National Laboratory, will make it possible to validate advanced supercomputer codes for the study of materials under extreme conditions that are closer to those in a nuclear explosion.

In addition, progress continues in the ability to detect, from great distances, very-low-yield underground tests performed covertly in an effort to violate a CTBT. Under a CTBT, the integrated worldwide resources for detecting and characterizing nuclear explosions will be further enhanced. The ability to verify nuclear explosions is important, independent

of whether a comprehensive test ban is in place.

An in-depth review of all those advances should be prepared and presented to the Senate in public hearings, to the extent possible.

▶ *Providing the highest possible standards of security for all stocks of weapons, weapons-usable plutonium, and highly enriched uranium everywhere in the world.*

The Nunn–Lugar program should be extended globally and should continue to be strengthened in terms of resources, leadership, and diplomacy. United Nations Security Council Resolution 1540 concerning nonproliferation should be made mandatory to the extent feasible.[10]

▶ *Getting control of the uranium enrichment process, combined with the guarantee that uranium for nuclear power reactors could be obtained at a reasonable price, first from the Nuclear Suppliers Group[11] and then from the IAEA or other controlled international reserves. It will also be necessary to deal with proliferation issues presented by spent fuel from reactors producing electricity.*

This calls for an enhanced diplomatic effort to generate an international mechanism that will guarantee all countries the availability of nuclear fuel for peaceful uses and establish safeguards against the further spread of technology for uranium enrichment and fuel reprocessing.

▶ *Halting the production of fissile material for weapons globally; phasing out the use of highly enriched uranium in civil commerce and removing weapons-usable uranium from research facilities around the world and rendering the materials safe.*

How can negotiations jump-start the process? The challenges are to verify and enforce mechanisms that confirm the production cut-off and to develop technical alternatives to using highly enriched uranium in research and commercial installations around the world.

▶ *Redoubling our efforts to resolve regional confrontations and conflicts that give rise to new nuclear powers.*

This step is a call for continued high-priority diplomatic efforts, perhaps including efforts to expand regional nuclear-free zones.

In addition to the eight items detailed above, it will be important to develop effective measures to impede or counter any nuclear-related conduct that is potentially threatening to the security of any state or people. Such measures will require both technical and diplomatic efforts. Examples include cooperative international early warning systems; shared, limited defenses against nuclear-armed ballistic missiles to protect against a cheater who develops a primitive nuclear missile threat; and agreements to codify reasonable and enforceable limitations on antisatellite developments and on long-range missiles.

At the highest political levels—the presidential level for the US—a serious international diplomatic initiative will be needed to endorse the Reykjavík vision of a nuclear-free world and energize an effort toward realizing the world that ought to be from the world that is today.

Reassertion of the Reykjavík vision coupled with practical measures toward attaining it could have a profoundly positive impact on the security of future generations. Without the bold vision, the actions will not be perceived as fair or urgent. Without the actions, the vision will not be perceived as realistic or achievable.

This article is based on the talk, "What Are Nuclear Weapons For?" that I gave at the 2007 March meeting of the American Physical Society. That talk drew from the Wall Street Journal *article cited in the text.*

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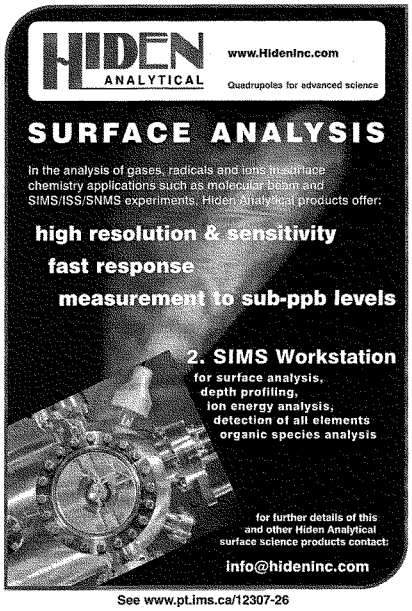

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QUESTIONS AND ANSWERS SUBMITTED FOR THE RECORD

JULY 18, 2007

QUESTIONS SUBMITTED BY MS. TAUSCHER

Ms. TAUSCHER. With substantial advances in conventional munitions, why should the U.S. need or want to rely on nuclear weapons to hold at risk enemy targets?

Dr. PAYNE. With end of the Cold War, many thoughtful people understandably ask why the United States should continue to maintain nuclear weapons. What role do they serve? Couldn't we defeat most plausible adversaries with our conventional forces alone?

To address those questions requires that we examine the multiple roles served by nuclear weapons. We need to look beyond the military characteristics of U.S. nuclear weapons and address the broader spectrum of national defense goals they serve. These goals—deterrence, assurance, and dissuasion—reflect our core objectives of protecting the United States and allies, working to limit the proliferation of nuclear weapons and other weapons of mass destruction, and steering potential adversaries away from military challenges and competition.

There should be no desire to rely on nuclear weapons per se; there is, however, a continuing need for nuclear weapons to support these overarching U.S. defense goals of deterrence, assurance, and dissuasion. None of these roles for nuclear weapons follows from a "war-fighting" policy orientation, presumes the actual military employment of nuclear weapons, or entails a requirement to do so. The value of nuclear weapons for deterrence, assurance and dissuasion resides in their continued role as a withheld threat.

First, we can examine deterrence. The value of effective deterrence did not end with the Cold War; it remains essential to national security and nuclear weapons remain essential to effective deterrence. By helping to prevent war and the need to use force, nuclear deterrence does not represent a disdainful "trap" as some commentators have claimed. They are an enormously valuable tool of deterrence that should be given up only after careful consideration. As Winston Churchill observed, "Be careful above all things not to let go of the atomic weapon until you are sure and more than sure that other means of reserving peace are in your hands!"

Strategic nuclear weapons that can threaten an adversary's valued targets from afar are, and are likely to remain essential for holding particularly well-protected targets at risk for deterrence purposes; these targets are, for all practical purposes, invulnerable to non-nuclear threats and are likely to remain so for the foreseeable future. The potential importance to effective deterrence of the U.S. capability to hold these types of targets at risk from afar is suggested by the attention and resources some adversaries devote to protecting and shielding them. Adversaries unsurprisingly seek to protect what they value. And, as Secretary of Defense during the Carter Administration, Dr. Harold Brown emphasized when in office, U.S. deterrence threats should be capable of holding at risk those assets particularly valued by the adversary. In some important cases U.S. non-nuclear threats can not do so and can promise little deterrent effect. The invasion of an adversary's territory places an opponent's physical targets in the control of U.S. forces and renders many or all of those targets vulnerable to U.S. non-nuclear threats. In the context of a defeated opponent, however, the goal of deterring that opponent is unlikely to remain on the agenda, and invasion of an opponent's territory often is not an appropriate option.

In addition, there is no doubt that some opponents who were *not* deterrable via U.S. non-nuclear threats were in fact deterred by what they interpreted to be nuclear threats. This deterrent effect is a matter of adversary perceptions, not our preferences: whatever we believe about the lethality of U.S. non-nuclear weapons and what should be their deterrent effect, and whatever our hopes might be about how adversaries should think and behave, the actual behavior of past adversaries has shown beyond doubt that there can be a profound difference between the deterring effects of nuclear and non-nuclear weapons. In some cases, given the adversary's views and the context, only nuclear deterrence works. To assert that nuclear weapons now are unimportant is to suggest either that deterrence no longer is important, or that the future will be much more benign than the past and we will not again confront such opponents armed with dangerous weapons. There is every reason to reject both propositions. U.S. policy with regard to nuclear weapons should

not be based on optimistic hopes that so contrast with the actual past behavior of foes. Given past experience, the burden of proof is on those who now contend that nuclear deterrence no longer is necessary to preserve the peace.

The question is not whether we "want" to rely on nuclear weapons for deterrence. It is whether we are willing to accept the risk of deterrence failure that would be introduced by our inability to threaten some of our adversaries' highly-valued targets that are essentially impervious to non-nuclear weapons and/or our inability to threaten nuclear escalation in response to a severe provocation. The risk of deterrence failure flowing from such inabilities can not be calculated with precision. Because multiple contemporary opponents possess nuclear and/or biological weapons, the consequences of deterrence failure could be measured in thousands to millions of U.S. and/or allied casualties. The risk of deterrence failure following from U.S. abandonment of nuclear capabilities may be low or high depending on the opponent and context. But even low-probability events deserve serious consideration if they have potentially severe consequences. The move to reliance on non-nuclear weapons to hold enemy targets at risk would carry the increased risk of deterrence failure, and the probability may not be low.

Next, we can examine the role of nuclear weapons for the assurance of allies. Nuclear weapons are essential to the U.S. extended deterrent. This "nuclear umbrella" is central to the basic U.S. defense goal of assurance. This is not a trivial goal. The assurance provided to allies by U.S. security commitments, particularly including the U.S. nuclear umbrella, is key to the maintenance of U.S. alliance structures globally. It is part of the basic security considerations of countries such as Japan, South Korea and Turkey. The continuing role of U.S. nuclear weapons for this purpose may not be the preference of those in the United States who would prefer that the U.S. umbrella be non-nuclear. But what does or does not assure allies is not decided by U.S. commentators or U.S. political preferences, but by the allies themselves. The United States can decide if the assurance of allies is a worthy continuing goal, but only our allies can decide whether they are sufficiently assured. In this regard, available evidence points strongly to the fact that *nuclear* weapons remain critical to the assurance of key allies. For example, the recent responses by Japan and South Korea to the North Korean nuclear test of October 9, 2006 demonstrated explicitly that U.S. *nuclear* weapons are viewed by allies as critical to their confidence in the U.S. extended deterrent. The discomfort felt by allies and friends in the Middle East given the prospect of Iranian nuclear weapons points in the same direction.

We could decide that we would prefer to withdraw the nuclear umbrella and provide non-nuclear extended deterrence. But, with the nuclear proliferation of North Korea and the apparent Iranian aspirations for nuclear weapons, the response of key allies to the U.S. withdrawal of its nuclear extended deterrent coverage would create new and potentially severe problems, i.e., nuclear proliferation by U.S. friends and allies who would likely feel too vulnerable in the absence of U.S. extended nuclear deterrence. Japanese leaders have been explicit about the extreme security value they attach to the U.S. nuclear umbrella, and that Japan would be forced to reconsider its non-nuclear status in the absence of the U.S. extended nuclear deterrent. Ironically, nuclear non-proliferation is tied closely to the U.S. *preservation of its extended nuclear deterrent*. This point is contrary to the typical contention that U.S. movement toward nuclear disarmament promotes nuclear non-proliferation. Precisely the reverse linkage may be more the reality: U.S. movement toward nuclear disarmament will unleash what some have called a "cascade" of nuclear proliferation among those countries which otherwise have felt themselves secure under the U.S. extended nuclear deterrent and therefore have chosen to remain non-nuclear. We should be extremely careful before moving in a direction that carries the risk of unleashing this "cascade," such as deciding that U.S. nuclear weapons are unnecessary for assurance and moving toward a non-nuclear force structure.

Next, we can consider the role of nuclear weapons for dissuasion. The goal of dissuasion involves discouraging opponents and potential opponents from militarily challenging the United States. Dissuasion does *not* involve the use of force, but having the force structure necessary to discourage opponents from anticipating success in competing militarily with the United States. A past example of dissuasion was the Soviet decision to scale back its deployment of ballistic missile defense in the 1960s because the Soviet leadership understood that the U.S. strategic offensive potential could overwhelm Soviet defenses. The maintenance of U.S. nuclear capabilities and a viable nuclear infrastructure may be necessary to discourage opponents from choosing to engage in a nuclear competition in arms.

For example, the elimination or steep reduction of U.S. ICBMs would lower the bar considerably for an adversary who might, under such circumstances, consider realistic the possibility of achieving a counterforce strike option against the United

States. Maintaining a set of diverse nuclear retaliatory capabilities serves to discourage the aspiration for any such option. Consequently, it may be critical for dissuasion purposes to maintain an adequate nuclear force structure, particularly because if the United States decides to give up deployed forces, it will certainly would not be able to recover those capabilities easily, inexpensively or quickly. As the Chinese, by their own statements, move toward greater interest in counterforce nuclear options, keeping the bar high for any possible success in that regard may be critical to future stability. Moving to a very small number of U.S. nuclear retaliatory capabilities could encourage the Chinese in the wrong direction.

There are risks associated with retaining and modernizing the U.S. nuclear arsenal; there also would be risks in not doing so. Nuclear weapons may be critical for the deterrence of war and the dissuasion of military competition; and, they are critical to the assurance of allies who have indicated that they will considering moving toward their own nuclear capabilities if they conclude that the U.S. extended nuclear deterrent no longer is reliable. Advocates of the elimination of U.S. nuclear weapons tend to presume they know that adversaries will continue to be deterred by U.S. non-nuclear weapons, that allies will continue to be assured by the same, and that the U.S. "good example" of moving away from nuclear weapons would be emulated. Again, the burden of proof should be on those who make such claims, particularly when considerable available evidence points to the contrary.

Ms. TAUSCHER. Is there a technical rationale for maintaining such a hedge? In your estimation, how likely are weapons in the current stockpile to develop problems that would render them unreliable and/or unsafe?

Dr. DRELL. I do not see a technical rationale for retaining the large hedge of several thousand warheads, or more, that are currently in the U.S. nuclear arsenal. The weapons in our current stockpile are confirmed to be safe and reliable by the Stockpile Stewardship Program and we have seen no significant evidence of their aging. With a Strong Stockpile Stewardship and Life Extension Program, that has been highly successful for more than a decade, we can be confident that, should any unforeseen or unanticipated problems arise, we will hear the warning bells. I believe it is important that we maintain the infrastructure, including a limited pit production capacity, so that we will be able to respond in a timely way should unanticipated problems arise, either on technical or on strategic/political grounds. I would like the United States to begin to move away from a large operationally deployed force toward one that is primarily a responsive, or reserve, force.

Ms. TAUSCHER. If the U.S. were not to pursue the RRW program, do you have any concerns about the reliability of the existing stockpile? Over what time frame does your confidence extend?

Dr. DRELL. As long as our very successful Stockpile Stewardship and Life Extension Programs continue to be supported and executed to their current high professional standards, I have no serious concerns about the reliability of the existing stockpile. One of the concerns prior to a year ago was the lifetime of plutonium in the pits. As widely reported, that concern has been removed by findings by the weapon labs, as reviewed by JASON. Conservatively stated, my confidence extends well into the future, certainly beyond the next 20 years.

An RRW program performing research as currently configured at the phase 2a level is a sensible component of the ongoing Stockpile Stewardship and Life Extension Programs. Before proceeding beyond the Livermore design effort for RW1, we should determine whether or not the envisaged changes in warhead design to improve safety, long-term reliability, and use control can be achieved and certified for operational deployment without requiring underground nuclear testing.

Ms. TAUSCHER. What do you think would be the framework for negotiations for a follow-on to START (which expires in December, 2009)?

Dr. DRELL. Follow-on negotiations to START should address three important goals:

1. Continuing to reduce substantially the size of nuclear forces, consistent with U.S. national security.
2. Removing deployed nuclear forces from prompt launch procedures ("hair-trigger alert") and thereby reduce the danger of use of a nuclear weapon due to erroneous threat information, accident, or unauthorized action.
3. Ensuring that we have effective means to verify compliance with the commitments specified in the above two steps.

Goal 1:

In my written testimony for the July 18 hearings, which I submitted for the record, I discussed issues arising when addressing this goal. Specifically, I suggested near-term reductions to 500 operationally deployed strategic warheads plus a re-

sponsive force of comparable size, en route to a total force exclusively of 500 responsive warheads.

This issue calls for a review of the role of nuclear weapons in the post-cold war world, particularly to address how many deployed and reserve warheads and delivery systems are needed. Can we move to a force structure consisting exclusively of responsive forces that can be activated as required during a time of rising tension? Reductions would necessarily start with Russia and the U.S., who possess more than 90% of all nuclear weapons. What rate of reduction is practical, recognizing that to achieve significant reductions down to the force level proposed above, coordinated actions and negotiated agreements among all the nuclear powers will be required? What monitoring and verification tasks will need to be accomplished to support such reductions?

Goal 2:

The focus here is on what actions can be taken to increase warning time and reduce the number of operationally deployed nuclear weapons that have procedures in place for a prompt launch. Possibilities that might be considered include changes in missile hardware requiring pre-launch actions to enable an attack; separating warheads from delivery systems; software changes in the command structure that would require time to enable arming; or removing all nuclear-armed ballistic missiles and relying exclusively on long-range bombers for delivery systems. Such a "zero ballistic missile" option was considered during the Reagan administration.

Goal 3:

The monitoring and verification requirements to ensure compliance with provisions described in Goals 1 and 2 are considerable. They require verifying numerical limits on warheads and launchers on both deployed and responsive (or reserve) forces as well as building confidence in command procedures. The follow-on to START should also incorporate cooperative measures that would strengthen the protection of all nuclear weapons against terrorists gaining access to them. These requirements are broader than those developed and implemented for the soon-to-expire START treaty.

Ms. TAUSCHER. Under terms of the Strategic Offensive Reductions Treaty (SORT), the U.S. is currently on a path toward a nuclear weapons arsenal of between 1,700 and 2,200 "operationally deployed" strategic weapons.

Do you see any risks to the U.S. moving lower than the SORT-specified range? In your estimation, what is the proper range to aim for by the end of the next decade (2020)?

Dr. PERRY. [The information referred to was not available at the time of printing.]

Ms. TAUSCHER. What should be our objective in negotiating a follow-on to the START treaty after it expires in December 2009?

Dr. PERRY. [The information referred to was not available at the time of printing.]

Ms. TAUSCHER. Since President George H.W. Bush's announcement regarding land-based and sea-based tactical nuclear weapons in 1991, neither the U.S. nor Russia has moved to significantly reduce its stocks of such non-strategic weapons.

In your estimation, is there a remaining military utility for such weapons? Is there a diplomatic utility for them?

Dr. PERRY. [The information referred to was not available at the time of printing.]

Ms. TAUSCHER. What steps would the U.S. need to take to assure NATO allies that tactical nuclear weapons are not required for meaningful security assurance from the U.S.?

Dr. PERRY. [The information referred to was not available at the time of printing.]

QUESTIONS SUBMITTED BY MR. THORNBERRY

Mr. THORNBERRY. Do you believe the U.S. can maintain a smaller nuclear arsenal if we proceed with replacing legacy weapons with newer, proven designs such as those envisioned in the Reliable Replacement Warhead (RRW) modernization program?

Dr. PAYNE. Officials from the Departments of Defense and Energy have stated that one of the benefits of the RRW program would be a smaller total nuclear arsenal needed to support the planned nuclear force posture. The logic is compelling. Currently, the U.S. maintains an inventory of non-deployed warheads as reliability back-ups for aging legacy warheads. These older warheads were not designed with the expectation that they would be maintained indefinitely without nuclear testing. In contrast, RRWs are being designed with the goal of avoiding the need for nuclear testing. If some or all of the legacy warheads are replaced by RRWs, there would be less need for reliability back-up warheads. In addition, with the nuclear infra-

structure operational and producing RRW warheads, any questions over reliability of deployed nuclear warheads would likely be resolved more quickly than with a partially active, less capable nuclear infrastructure. The RRW program would result in significant improvements in the ability of the infrastructure to fix identified problems. This would further reduce the dependence on non-deployed warheads and enable reductions in the overall nuclear stockpile.

Mr. THORNBERRY. In your opinion, is it in the best interest of U.S. national security to continue maintaining a variety of nuclear weapons with various yields and uses in a post-Cold War era?

Dr. PAYNE. Yes. For the purposes of deterring enemies and assuring our allies it is important to have nuclear weapons with variable yields. For example, having very low-yield and precise weapons in our arsenal should help to limit the opportunities for opponents to believe that they can discount U.S. deterrence threats because they understand the priority we place on avoiding unintended casualties. The potential for unintended civilian casualties can increase with higher-yield and/or imprecise weapons; in the absence of low-yield, precise weapons, an opponent could attribute little or no credibility to U.S. deterrent threats given our proper concern about civilian casualties. This reason for having a variety of weapons and yields has nothing to do with a "warfighting" nuclear policy. It is to strengthen the deterrent effect of our forces.

Mr. THORNBERRY. Do you believe the U.S. can maintain a smaller nuclear arsenal if we proceed with replacing legacy weapons with newer, proven designs such as those envisioned in the Reliable Replacement Warhead (RRW) modernization program?

Dr. DRELL. I am on record as concluding that the U.S. can maintain a smaller nuclear arsenal with the legacy weapons that we have. The answer to the question of whether the RRW can help achieve this goal is yet to be established. Our existing legacy stockpile is safe, reliable, and shows no significant signs of aging. The study done earlier this year for the American Association for the Advancement of Sciences (AAAS), chaired by Dr. Bruce Tarter, Emeritus Director, Lawrence Livermore National Laboratory, affirms this same conclusion. The question that remains to be answered is this: Can a new warhead be designed that meets the principal goals of the RRW program to achieve enhanced safety, reliability, and use control, and that can be certified for deployment, without requiring underground nuclear explosive testing? I support research (Phase 2A as is currently being done) to see if it is possible to establish a scientific consensus confirming that this can be done. If the program confirms this possibility, and the costs are judged to be acceptable, even perhaps reducing the cost of maintaining the stockpile, then the answer to your question may be positive. I say "may be" because a decision to deploy new RRW warheads must carefully weigh its technical benefits against its potential impact on the strategic goals of the United States. These include, in particular, maintaining the cooperation of our allies and friends in enforcing a verifiable nuclear non-proliferation regime.

Mr. THORNBERRY. In your opinion, is it in the best interest of U.S. national security to continue maintaining a variety of nuclear weapons with various yields and uses in a post-Cold War era?

Dr. DRELL. As long as it is in the U.S. strategic interest to have a nuclear arsenal, it is best to continue maintaining a variety of nuclear weapons in order to avoid common mode failures for the launch procedures, the delivery systems (bombers and missiles), and the warheads. In the post-Cold War world, I consider the need for the higher yield weapons to be greatly reduced relative to the lower yield ones.

Mr. THORNBERRY. Do you believe the U.S. can maintain a smaller nuclear arsenal if we proceed with replacing legacy weapons with newer, proven designs such as those envisioned in the Reliable Replacement Warhead (RRW) modernization program?

Dr. PERRY. [The information referred to was not available at the time of printing.]

Mr. THORNBERRY. In your opinion, is it in the best interest of U.S. national security to continue maintaining a variety of nuclear weapons with various yields and uses in a post-Cold War era?

Dr. PERRY. [The information referred to was not available at the time of printing.]

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