

# U.S.-Russian Nuclear Reductions After New START:

## Summary of a Workshop Exploring Next Steps

Workshop hosted by the APS Panel on Public Affairs  
and the Center for Strategic and International Studies.



## ACKNOWLEDGEMENTS

Many thanks to Linton Brooks and John Ahearne for their thoughtful comments on this paper. Support for this project was provided by the American Physical Society, the Center for Strategic and International Studies, and through the U.S. State Department [grant number: SAQMMA12M 2598].

## BACKGROUND

This paper is a summary of a workshop that was held to explore possible reductions in tactical nuclear weapons. The workshop was co-sponsored by the U.S. Department of State, the American Physical Society Panel on Public Affairs (APS-POPA), and the Center for Strategic & International Studies (CSIS). The project was overseen by a joint APS-POPA & CSIS Steering Committee, which was responsible for inviting the participants and organizing the workshop.

## ABOUT APS & POPA

The American Physical Society was founded in 1899, with a mission of advancing and diffusing the knowledge of physics. APS is now the nation's leading organization of research physicists with approximately 50,000 members in academia, national laboratories, and industry. APS's work on this paper was overseen by the APS Panel on Public Affairs (POPA). POPA occasionally produces reports on topics currently debated in government in order to inform the debate with the perspectives of physicists working in the relevant issue areas. Indeed, APS has long played an active role in federal government with its members serving in Congress and having held positions such as Science Advisor to the President of the United States, Director of the CIA, and Director of the NSF.

## ABOUT CSIS

The Center for Strategic and International Studies (CSIS) is a bipartisan, nonprofit organization that conducts research and analysis to provide strategic insights and policy solutions to decision makers in government, international institutions, the private sector, and civil society. Founded in 1962, CSIS has grown to become one of the world's preeminent international policy institutions, with more than 220 full-time staff and a large network of affiliated scholars focused on defense and security, regional stability, and transnational challenges ranging from energy and climate to global development and economic integration.

## WORKSHOP STEERING COMMITTEE

### Jay Davis (co-Chair)

President, Hertz Foundation

### John Hamre (co-Chair)

President, Center for Strategic and International Studies

### Vince Manzo

Center for Strategic and International Studies

### Clark Murdock

Center for Strategic and International Studies

### Jim Trebes

Lawrence Livermore National Laboratory

## APS STAFF

**Francis Slakey**

**Jeanette Russo**

## WORKSHOP PARTICIPANTS

(not including Steering Committee):

### U.S.:

**Kathleen Bailey**

National Institute for Public Policy

**Paul Bernstein**

National Defense University

**Barry Blechman**

Stimson Center

**John Browne**

Retired Director, Los Alamos National Laboratory

**Burgess Laird**

Institute for Defense Analyses

**Ron Lehman**

Lawrence Livermore National Laboratory

**Jeffrey McCausland**

Strategic Studies Institute

**Nancy Jo Nicholas**

Los Alamos National Laboratory

**Steven Pifer**

The Brookings Institute

**Paul Rockett**

Lawrence Livermore National Laboratory

**Dakota Rudesill**

Georgetown Law Center

**Benn Tannenbaum**

Sandia National Laboratories

**Libby Turpen**

Independent Consultant

### Europe:

**Mustafa Kibaroglu**

Okan University

**David Lee**

European Physical Society

**Götz Neuneck**

University of Hamburg

**Bernard Norlain**

Retired General, French Air Force  
(Français de L'Armée de l'air)

**Andreas Persbo**

VERTIC

### Russia:

**Anatoli Diakov**

Moscow Institute of Physics & Technology

**Eugene Miasnikov**

Center for Arms Control, Energy & Environmental Studies

**Pavel Podvig**

Russian Nuclear Forces Project

---

## Table of Contents

<b>Overview .....</b>	<b>2</b>
Background.....	2
Concept.....	2
Results.....	3
<b>Options.....</b>	<b>4</b>
A Limited Action .....	4
An Ambitious Treaty .....	6
<b>Background Materials .....</b>	<b>8</b>
New START and Non-Strategic Nuclear Weapons.....	8
Pavel Podvig, Russian Nuclear Forces Project	
The State of Verification Science for Non-Strategic Nuclear Weapons.....	11
Nancy Jo Nicholas, Los Alamos National Laboratory	
Day 1: Group 1 Discussion Notes .....	14
Jim Trebes, Lawrence Livermore National Laboratory	
Day 1: Group 2 Discussion Notes .....	17
Clark Murdock, Center for Strategic and International Studies	
Day 2: Joint Session Notes.....	21
Vince Manzo, Center for Strategic and International Studies	

---

## Overview

### BACKGROUND

The New START treaty, ratified by the Senate on December 22nd, 2010, established a path of reductions in the total number of strategic nuclear weapons.<sup>1</sup> The U.S. Senate indicated through the New START treaty process their interest in addressing the technical and policy challenges associated with reducing the non-strategic nuclear weapons (NSNW) currently deployed in Europe and Russia, commonly referred to as “tactical nuclear weapons.”<sup>2</sup>

The reduction of NSNW is burdened by several issues. There are substantial conventional force and nuclear force asymmetries—Russia has thousands of NSNW and the U.S. has hundreds. An additional complication is that while non-nuclear NATO states have varying opinions as to the utility of the U.S. NSNW, many, particularly the newer members, view the weapons as an assurance of U.S. commitment to their security. Indeed, some regard U.S. deployment of NSNW in Europe as the final and irreplaceable assurance of Washington’s commitment to their security.

### CONCEPT

To explore the texture of the various challenges associated with reductions of NSNW, CSIS and the APS proposed an experiment: a discussion of policy and technology options in the context of a hypothetical agreement between the U.S. and Russia. The Department of State supported the concept and on February 25th and 26th, CSIS and APS convened a group of approximately thirty policy and technology participants drawn from the U.S., Europe and Russia, and asked them to explore what would be necessary to implement and to verify the following:

#### Hypothetical Treaty:

[Withdrawal of U.S. NSNW to the American mainland and withdrawal of Russian NSNW behind the Urals.](#)

It was made clear to the participants that this was not necessarily an optimum Hypothetical Treaty, nor was it one that the sponsors were supporting for implementation. Rather the Hypothetical Treaty was one whose discussion would flesh out the issues associated with a real treaty, and—as we fully expected—connections to other issues such as conventional force imbalances and U.S. allies in Asia.

Participants were not constrained by existing mandates of the various governments (e.g., U.S. Congressional statements that the stockpile and Triad be maintained in near-present size and form, Russian doctrines on the use of NSNW, German desire for all weapons removal, Turkish insistence in burden sharing, etc.) We asked participants to work on this construct in the spirit of experimentalists. Indeed, one sometimes does an experiment to find out what experiment should really be done.

Participants were divided into two groups. The first group simply made a cold start on discussion of the problem. The second group received a more detailed scenario and definitions. Both were asked not to fight the scenario, but to instead explore the obstacles and opportunities for ratification. All discussions were conducted under Chatham House Rules, statements made by the participants could be used in the report but with no personal attribution. At noon on the first day, the two groups rejoined to hear Undersecretary of State Rose Gottemoeller discuss U.S. priorities and current thoughts regarding NSNW. The groups rejoined at the end of the first day to discuss their findings, then spent the morning of the second day in a detailed conversation about what had been learned. The notes were written up and then circulated to participants for their comments and approval.

---

1 <http://www.state.gov/documents/organization/140035.pdf>

2 To a great extent, the distinction between “strategic” and “tactical” nuclear weapons is an artifact of the Cold War, because most in the policy community, both official and non-official, agree that any use of a nuclear weapon would have strategic impacts on the conflict. The term “tactical” is used in this study because (1) it is commonly used and (2) no U.S.-Russian arms reduction treaty has ever addressed the issue of forward-deployed U.S. and Russian tactical nuclear weapons.

---

## RESULTS

The Report that follows is a written summary of the workshop. The details of the Group breakout discussion, the two presentations, and the Day 2 conversations are provided in full in Section 3.

In brief, the two groups broke into separate rooms on Day 1, yet both groups began by clarifying the definitions of NSNW and total stockpiles. They also acknowledged that the Hypothetical Treaty would need to fit into the larger discussions of cooperative security between the U.S. and Russia. Both groups identified a substantial challenge to relocating Russian NSNW out of the Atlantic-to-the-Urals area: the negative impact on China (who would perceive the Russian action as threatening) and U.S. allies in Asia (who had objected in 1986 to the agreement between Presidents Bush and Gorbachev at Reykjavik to move Soviet SS-20s east of the Urals). Such an agreement would, in the view of many, be unstable because both the U.S. and Russia could easily reintroduce NSNW into the theater. Participants were divided on the value of U.S. NSNW in Europe. Some argued that the American conventional presence in Europe is sufficient for “coupling” U.S. and European security and others believed that the forward-deployed U.S. NSNW represent the ultimate security assurance for them.

There was near unanimous agreement by the end of the Workshop that the Hypothetical Treaty, however desirable, was unachievable at the present time. Instead, the two breakout groups identified two alternatives: go small or go big. The two alternative options are presented in the following pages.

With these two options now clarified, participants believe that the next step is to identify and stimulate cooperative R&D for verification that can support these options. The CSIS, APS-POPA and scientists who participated in this workshop are willing to pursue this next step.

Jay Davis  
Workshop Co-Chair

John Hamre  
Workshop Co-Chair

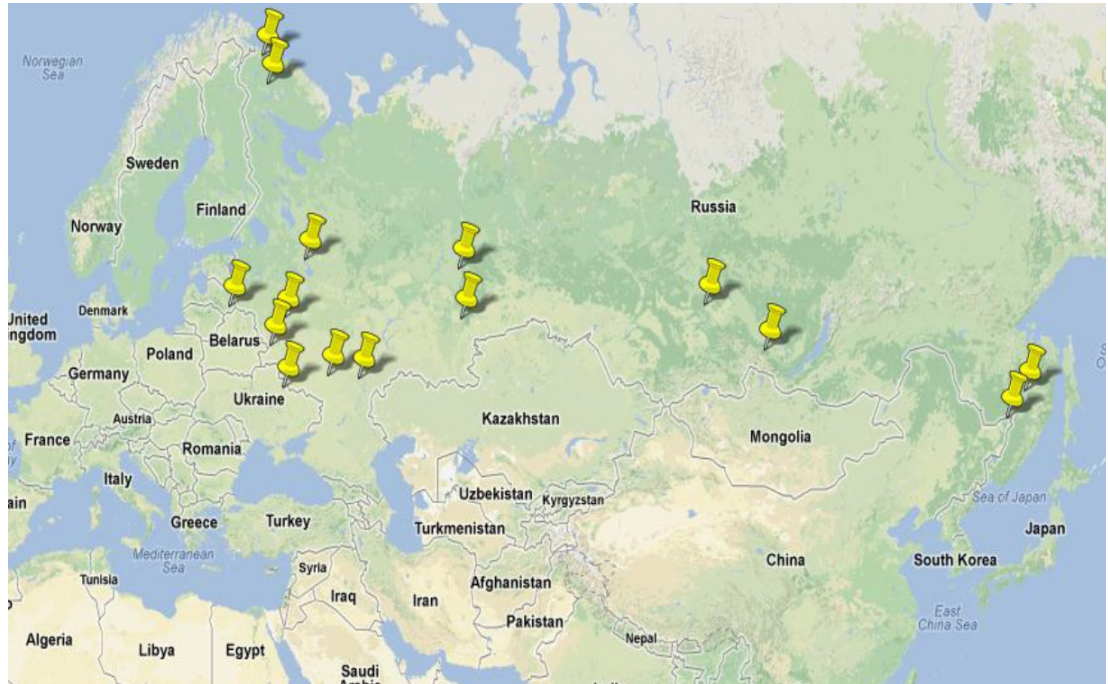
June 24, 2013



## Option 1: A Limited Action

### CONCEPT

The U.S. withdraws its non-strategic nuclear weapons from Europe, accompanied by Reforger Exercises to demonstrate the ability to rapidly redeploy if necessary. Russia declares its total number of NSNW, confirms their non-deployed status, and reduces the number of storage locations from the current 12 to a few centralized sites.



*Current Russian NSNW storage locations*

### ASSESSMENT

#### Establishes Baselines

The United States is estimated to have about 500 nuclear warheads that could be assigned to non-strategic delivery systems, while Russia is believed to have about 2,000 warheads in this category—although the precise number is uncertain.<sup>3</sup> The proposed Action would establish hard numbers that would inform any future negotiations.

#### Enhances Security

With the elimination of U.S. NSNW from Europe and the consolidation of Russian NSNW, overall opportunities for illicit access to nuclear weapons would be reduced, a step that enhances cooperative security.

#### Maintains Momentum

The next round of arms control negotiations presents substantial challenges that may require resolving a number of political issues that range from missile defense, to the potential for conventional global strike capabilities, to the balance of conventional forces. This proposed Action, while limited, would maintain momentum for arms control while these challenges can be examined and negotiated.<sup>4</sup>

<sup>3</sup> Reducing the Role of Tactical Nuclear Weapons in Europe: Perspectives and Proposals on the NATO Policy Debate, Paul Ingram and Oliver Meier, May 2011, published by the Arms Control Association.

<sup>4</sup> See, for example: Michael Brzoska, G. Neuneck, A. Finger, O. Meier, W. Zellner: Prospects for Arms Control in Europe, November 2011.

---

### **Codifies Non-Deployed Status**

Neither Russia nor the United States keep their non-strategic weapons mated to delivery systems, so none of these weapons would be considered deployed. The Russian government has repeatedly stated on record that all its non-strategic nuclear warheads have been consolidated at centralized storage facilities.<sup>5</sup> The United States also keeps its non-strategic weapons de-mated from delivery systems, although some weapons are stored in close proximity to the delivery aircraft.<sup>6</sup> Hence, this Action would confirm the non-deployed status of NSNW.

### **Verification Methods**

Under this Action, Russia would consolidate its NSNW to fewer locations, necessitating verification of the absence of nuclear warheads in declared centralized sites—an easily verified requirement. There would also need to be procedures to verify the absence of nuclear warheads on delivery systems—a much simpler task than verifying the number of nuclear weapons, deployed or non-deployed. While most of the New START framework could be extended beyond U.S. and Russian strategic arsenals, there are a number of issues that would have to be addressed before New START provisions could be applied to non-strategic weapons which are considered later in this paper.

### **Congressional Response**

Since this Action relocates—but does not eliminate—NSNW, it would not run counter to the current Defense Authorization Act and it could perhaps be done without Senate ratification.

### **Maintains Only Limited Security Assurances with Allies**

The Reforger exercises would demonstrate the capability to rapidly redeploy NSNW if necessary. However, this concrete security assurance would no longer be immediately present and quickly available.

### **The Balance Between Effort and Benefit**

Every arms control action—even one as limited as this—requires exhaustive work to enact. So, it is essential to consider whether this Action is worth the effort. In particular, this Action could be viewed as the U.S. providing too much (removal of U.S. NSNW in Europe) while getting far too little in return. However, the current U.S. deployment of NSNW in Europe may be unsustainable in a time of growing budget austerity, and this Action could be well timed. The opportunity to get something for U.S. removal of NSNW in Europe only decreases with time.

---

5 See, for example, “Statement by the Delegation of the Russian Federation on Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons at the second Session of the Preparatory Committee for the 2010 Non-Proliferation Treaty Review Conference,” Geneva, April 28–May 9, 2008.

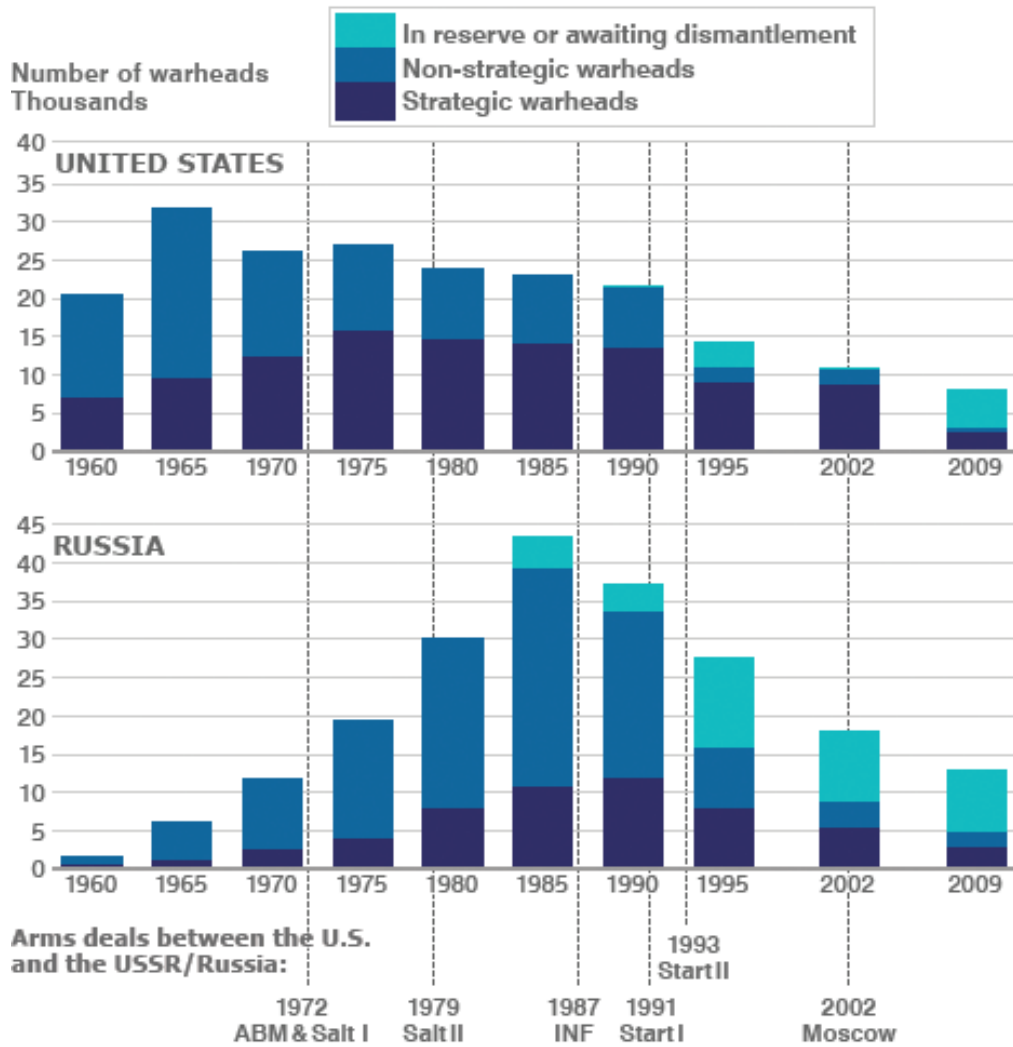
6 Hans Kristensen, Non-Strategic Nuclear Weapons, Federation of American Scientists, Special Report No 3, May 2012, pp. 11,17.

## Option 2: An Ambitious Treaty

### CONCEPT

A treaty establishes a global limit on the total number of U.S. and Russian nuclear stockpiles (e.g. to 2500) and sub-limits on deployed strategic weapons (e.g. from New START's 1550 warheads to 1000). Once a common limit on total nuclear weapons is agreed to, the United States and Russia would be free to choose within that limit, their own mixture of non-deployed strategic weapons and NSNW.

### U.S. AND RUSSIA NUCLEAR WEAPONS



SOURCE: Natural Resources Defense Council, Bulletin of the Atomic Scientists



---

## ASSESSMENT

### Flexibility

This Treaty gives both countries more force structure flexibility within the overall limit and deployed strategic nuclear weapon sub-limit, enabling them to choose the mix that best matches their perceived security needs. Russia could deploy more NSNW at the expense of its deployed and non-deployed strategic nuclear weapons, and the United States could retain more non-deployed strategic nuclear weapons, which the U.S. may consider a sufficient hedge against technological failures and unanticipated changes in the global security environment.

### Avoids Problem of U.S.-Russian NSNW Asymmetry

This Treaty avoids a current arms-control challenge; it would not require negotiating past the nuclear force asymmetries—Russia has thousands of NSNW and the U.S. has hundreds. Indeed, a continued NSNW asymmetry would be allowable, so long as the global limit on total numbers is achieved.

### Benefits Scale with the Effort

Every arms control treaty requires extensive analyses, time and energy to negotiate and ratify. Therefore, it is best to direct that effort towards agreements that can have a profound positive effect, such as this global limits proposal. This Treaty is likely to substantially reduce the role of nuclear weapons in both U.S. and Russian national security strategy. Further, this ambitious Treaty may provide the United States with more leverage to bring China and possibly others into the arms control process.

### Builds on Existing Methods

This Treaty can follow New START “counting rules” (e.g., each bomber counts as one warhead) and verification procedures. However, high transparency, beginning with numbers, types and locations of weapons, would be needed.

### Verification Challenges

Verification is not an absolute, but is instead a continuum that depends on the standard being applied, as well as the level of trust between the parties. For example, “adequate” verification may be sufficient to ensure that no militarily-significant cheating occurs. Even with “adequate” as a standard, on-site inspections would be required to verify declared statements. In order to address the “hidden arsenal” problem, a no-notice, no-refusal Suspect Site Inspection would likely be needed. Further, there would need to be agreed upon—or more preferably, for ease of implementation, U.S.-Russian jointly developed—verification technologies.

### Political Challenges

This Treaty allows Russia and the United States to vary the mix of non-deployed strategic weapons and NSNW enabling each to adapt their stockpiles to different national nuclear doctrines, thereby improving negotiability. However, this Treaty does not address the Russian desire to link any further progress on nuclear arms reduction to non-nuclear issues, such as ballistic missile defense and advanced conventional munitions. In the U.S., striving for a global limit on total nuclear stockpiles would likely face difficulty with respect to Senate ratification. The Obama Administration expended considerable political capital and agreed to a 10-year nuclear modernization to win Senate ratification of New START. A New START II agreement would be a significant reduction and likely would bring both the United States and Russia to the threshold of possible multilateral negotiations on further nuclear arms reductions and possible changes to respective nuclear doctrines and nuclear postures.

## Background Materials

### NEW START AND NON-STRATEGIC NUCLEAR WEAPONS

Pavel Podvig, Russian Nuclear Forces Project

Nuclear disarmament has always been one of the central issues of U.S.-Russian relationships and an important element of the effort to combat nuclear proliferation and counter the dangers associated with nuclear weapons. During his first term in office, President Obama made a commitment to “peace and security of a world without nuclear weapons” and worked with his Russian counterpart to negotiate the New START treaty that will reduce strategic nuclear arsenals of the two countries to the level of 1,550 nuclear warheads. In the beginning of the second presidential term, the U.S. administration pledged to renew its efforts to engage Russia in further reductions of nuclear arsenals. It has already begun preliminary discussions with Russian officials and is reported to be preparing specific proposals to Russia regarding future nuclear cuts.<sup>7</sup>

The new U.S.-Russian nuclear disarmament dialog is widely expected to address the issue of non-strategic nuclear weapons, which have not been covered by New START or earlier arms control agreements (with the exception of the INF treaty). Now that the strategic arsenals are being reduced to the level of about 1,500 warheads, it is increasingly difficult to justify the exclusion of non-strategic warheads from the disarmament talks.<sup>8</sup> The United States is estimated to have about 500 nuclear warheads that could be assigned to non-strategic delivery systems, while Russia is believed to have about 2,000 warheads in this category. There is a significant uncertainty in the number of non-strategic nuclear warheads in Russia, but all estimates suggest a degree of disparity between the U.S. and Russian non-strategic nuclear forces. If a new disarmament agreement takes a form of a legally binding treaty it would have to address the difference between U.S. and Russian non-strategic nuclear forces. In the New START resolution of ratification the U.S. Senate urged the administration “to address the disparity between the non-strategic (tactical) nuclear weapons stockpiles” in future negotiations with Russia, so it is unlikely to approve a treaty that does not include measures to that effect.<sup>9</sup>

The issue of expanding the scope of the U.S.-Russian nuclear disarmament dialog to non-strategic nuclear weapons has been a subject of intense discussion among experts for a long time. Although this discussion has not produced a consensus on the best way to deal with non-strategic nuclear weapons, several common themes have emerged. Most experts seem to agree that extending disarmament measures to non-strategic weapons would require access to non-deployed weapons at operational bases and storage facilities. Most proposals in this area also assume that the United States and Russia should exchange data on their non-strategic nuclear arsenals early in the process. Finally, a number of proposals suggest establishing a common ceiling that would limit all categories of nuclear weapons in active arsenals—strategic and non-strategic as well as deployed and non-deployed.

There are several arguments in favor of including non-deployed nuclear weapons, whether strategic or non-strategic, in the nuclear disarmament process. A strong case can be made that nuclear reductions should eventually cover all categories of nuclear warheads and also extend to weapon components and fissile materials. However, in the context of the U.S.-Russian arms control, the need to include non-deployed weapons is often justified by reasons that are more technical in nature.

First, it is often assumed that because of the variety of dual-capable systems that can be equipped with nuclear armaments, non-strategic weapons do not lend themselves to the strategic arms control approach, which relies primarily on limiting and reducing the number of delivery systems. Second, it is believed that a limit on non-deployed weapons could provide Russia with an incentive to initiate the discussion of non-strategic arsenals by limiting the U.S. “upload potential”—the capability to deploy additional warheads on the existing strategic launchers. Finally, establishing a limit on non-deployed weapons would probably help address the concerns about disparity between non-strategic arsenals expressed by the U.S. Senate.

---

7 R. Jeffrey Smith, “Obama administration embraces major new nuclear weapons cut,” The Center for Public Integrity, February 8, 2013, <http://www.publicintegrity.org/2013/02/08/12156obama-administration-embraces-major-new-nuclear-weapons-cut>.

8 In this paper the term “non-strategic nuclear weapons” is used to describe all nuclear armaments that are not explicitly covered by the New START or INF treaties.

9 U.S. Senate, New START Resolution of Ratification.

---

While an extension of U.S.-Russian talks to non-deployed weapons, whether strategic or non-strategic, would benefit the cause of nuclear disarmament, it is highly unlikely that the two countries could make progress in this area at this point. The United States and Russia have been discussing measures related to transparency of nuclear warhead inventories since the mid-1990s. At the time, the two countries made progress in verifying warhead dismantlement processes, but never resolved differences regarding accounting of warheads in active arsenals.<sup>10</sup> In the late 1990s, Russia discontinued most of the work in this area and there are no signs that it would be ready to resume it today. Indeed, during the New START negotiations it rejected the U.S. proposal to account for nuclear weapons assigned to strategic bombers that are stored at air bases, which indicates that a similar proposal related to non-strategic weapons is not likely to be accepted. As for the limit on the U.S. “upload potential,” which could have provided an incentive for Russia to return to accept the approach based on accounting for non-deployed weapons, the New START negotiations demonstrated that Russia no longer considers it a pressing issue—the treaty allows for significant disparity in the number of non-deployed strategic warheads that could be returned to deployed launchers. In this situation, an attempt to introduce non-deployed warheads in the U.S.-Russian discussion of further reductions is unlikely to help move the negotiations forward.

An alternative way of dealing with the issue of non-strategic nuclear warheads would use the approach developed during the New START negotiations. While the treaty still relies primarily on limiting the number of delivery systems, it contains a number of new elements that could potentially be adapted to non-strategic nuclear arms control. Unlike its predecessors that assigned a certain number of warheads to each deployed launcher, New START contains a limit on deployed nuclear warheads and provides a mechanism that could be used to verify the number of nuclear warheads that are actually deployed on delivery systems.

The most important consideration that would allow extending the New START framework to non-strategic nuclear weapons is the fact that neither Russia nor the United States keep their non-strategic weapons mated to delivery systems, so none of these weapons would be considered deployed. The Russian government has repeatedly stated on record that all its non-strategic nuclear warheads have been consolidated at centralized storage facilities.<sup>11</sup> Indeed, the only Russian delivery systems that carry nuclear warheads are land-based ICBMs and submarine-launched ballistic missiles.<sup>12</sup> The United States also keeps its non-strategic weapons de-mated from delivery systems, although some weapons are stored in close proximity to the delivery aircraft.<sup>13</sup>

In effect, the United States and Russia already have zero deployed non-strategic nuclear warheads. This means that an agreement that would address non-strategic weapons could confirm their non-deployed status and develop procedures that would verify the absence of nuclear warheads on delivery systems—a much simpler task than verifying the number of nuclear weapons, deployed or non-deployed. As discussed below, verification procedures included in New START would allow this without significant modifications.

Although most of the New START framework could be extended beyond U.S. and Russian strategic arsenals, there are a number of issues that would have to be addressed before New START provisions could be applied to non-strategic weapons.

First, although no U.S. or Russian non-strategic warheads are currently operationally deployed, the New START accounting rules, if strictly applied, would not allow either side to report zero deployed non-strategic warheads. The reason for this is that the treaty does not differentiate between nuclear and non-nuclear reentry vehicles on ballistic missiles and counts each nuclear-capable heavy bomber as a single deployed nuclear warhead. Therefore, under New START rules, each delivery system, such as an aircraft or an SLCM, that is designated as nuclear-capable

---

10 Anatoly Dyakov, “Nuclear Warheads and Weapon-Grade Materials,” in Alexei Arbatov and Vladimir Dvorkin, eds. *Nuclear Reset: Arms Reduction and Nonproliferation*, Carnegie Moscow Center, 2012, <http://www.armscontrol.ru/pubs/en/Diakov-NucWarheads.pdf>

11 See, for example, “Statement by the Delegation of the Russian Federation on Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons at the second Session of the Preparatory Committee for the 2010 Non-Proliferation Treaty Review Conference,” Geneva, April 28- May 9, 2008.

12 Based on a series of interviews with directors of the 12th Main Directorate that operates nuclear storage facilities. See “Poryadok v yadernykh chastyakh,” *Krasnaya zvezda*, 5 September 2006, [http://old.redstar.ru/2006/09/05\\_09/1\\_02.html](http://old.redstar.ru/2006/09/05_09/1_02.html), “Dezhurstvo u yadernoy knopki,” *Rossiyskaya gazeta*, 4 September 2007, <http://www.rg.ru/2007/09/04/orujie.html>, “Garanty yadernogo shchita,” *Krasnaya zvezda*, 3 September 2012, <http://www.redstar.ru/index.php/component/k2/item/4428-garanti-yadernogo-schita>.

13 Hans Kristensen, *Non-Strategic Nuclear Weapons*, Federation of American Scientists, Special Report No 3, May 2012, pp. 11, 17.

would account for one deployed nuclear warhead, even though it carries only conventional warheads. However, these rules were agreed upon in the context of strategic delivery systems that could carry multiple warheads. For non-strategic weapons these would be redundant, as each nuclear-capable delivery system would be accounted for as a deployed launcher. The accounting rules could therefore be modified, so no deployed nuclear warheads would be associated with nuclear-capable aircraft and only actual nuclear warheads deployed on other delivery systems would be counted against the treaty limit. Since this limit is expected to be zero, a modification of this kind should be possible.

Second, for a New START-type agreement to effectively cover non-strategic systems, it would have to pay special attention to measures that allow distinguishing between nuclear-capable and non-nuclear-capable systems. New START provides two ways of doing so that could be adapted to a variety of non-strategic systems.

New START allows an entire type of delivery system to be declared as non-nuclear capable and therefore exempt from the treaty limitations. Specifically, heavy bombers of a certain type would no longer be subject to the treaty if they all have been converted to “heavy bomber[s] equipped for non-nuclear armaments” with accordance to the treaty procedures.<sup>14</sup> The United States took advantage of this provision by demonstrating that all its B-1B bombers are not equipped for nuclear armaments and therefore will no longer be subject to the treaty limitations.<sup>15</sup>

Another New START provision allows conversion of heavy bombers within the same type—the treaty then requires that “a heavy bomber equipped for nuclear armaments shall be distinguishable from a heavy bomber equipped for non-nuclear armaments.”<sup>16</sup> No conversion of this kind has been completed yet, but the United States plans to leave only 40 of the 75 B-52H bombers it declared operational in 2011 as “equipped for non-nuclear armaments.” The B-52H bombers that will be converted for non-nuclear missions will no longer count toward the treaty limits.<sup>17</sup>

The bomber conversion provisions of the New START treaty demonstrate a practical possibility of measures that would allow drawing a demarcation line between nuclear and non-nuclear delivery systems. This could substantially reduce the verification burden in an agreement that would cover non-strategic weapons. The feasibility of implementing these measures in the context of non-strategic delivery systems has been demonstrated by Russia and Ukraine—one of the agreements that regulate presence of Russian aircraft at the Black Sea Fleet bases allows Ukraine to verify that these aircraft are not capable of carrying nuclear weapons.<sup>18</sup>

The New START inspection provisions contain a number of measures that could be used to verify the absence of deployed nuclear warheads on non-strategic delivery systems. To do so, inspectors are allowed to use radiation detection equipment specified in the treaty. For example, inspectors have the right to use this equipment to verify that objects “located on the front section of a deployed ICBM or deployed SLBM” or “located on a designated heavy bomber” and declared to be non-nuclear are, in fact, non-nuclear.<sup>19</sup> If an agreement that covers non-strategic systems assumes that no nuclear objects are allowed to be deployed on the inspected delivery systems, inspection procedures would be simpler than those in New START, which allows some nuclear warheads to be deployed.

Overall, progress in reaching an agreement on non-strategic nuclear weapons would require resolving a number of political issues that range from missile defense to the balance of conventional forces. If the United States and Russia could find a way to find a common ground on these issues, they should be able to resolve technical issues associated with non-strategic nuclear weapons as well. The approach to nuclear reductions that was developed in New START provides a time-tested framework for dealing with some of the problems that may be encountered on the way to an agreement on non-strategic weapons. If properly adapted, this framework could be used as a basis for deeper reductions of nuclear arsenals that would cover all categories of deployed nuclear weapons.

---

14 New START, Article III.7(c). The procedure is described in New START Protocol, Part III, Section V, Paragraph 3.

15 “New START Treaty Implementation Update,” Bureau of Arms Control, Verification and Compliance, May 17, 2012, <http://www.state.gov/t/avc/rls/183335.htm>.

16 New START, Article III.7(b).

17 Dave Majumdar, “DoD: Denuclearized B-52s OK Under New START,” Defense News, May 4, 2011, <http://www.defensenews.com/article/20110504/DEFSECT01/105040302DoD-Denuclearized-B-52s-OK-Under-New-START>.

18 Igor Sutyagin, “Atomic Accounting. A New Estimate of Russia’s Non-Strategic Nuclear Forces,” R.U.S.I. Occasional Paper, November 2012, p. 29.

19 Protocol to the New START Treaty, Annex on Inspection Activities, Part Five, Section VI, paragraph 1.

---

## THE STATE OF VERIFICATION SCIENCE FOR NON-STRATEGIC NUCLEAR WEAPONS

Nancy Jo Nicholas, Los Alamos National Laboratory

### Abstract

In this technical presentation to an audience of technical and policy arms control monitoring and verification experts I will discuss state of verification science and technology that could apply to NSNW: what tools are currently available, what's in the pipeline, what are the gaps.

I will provide examples from recent experience at Los Alamos National Laboratory developing and testing attribute verification systems with information barriers. I will highlight three challenges to providing confidence—in the measurement, protection system, and results. The presentation will focus on current work being done in the area of warhead monitoring, verification, and authentication.

### Current policy drivers for verification S&T

The U.S. will engage in a number of treaty negotiations on nuclear weapons and nuclear material in the coming years. Monitoring and verification measures are an integral part of these treaties and agreements. Of course the State Department takes the lead on treaty negotiations, but traditionally technical experts have been turned to for advice and tools. We develop (and demonstrate) hardware and software tools for the policy makers to have in their back pockets as they negotiate agreements. Under cooperative regimes a strategic objective to improve trust and transparency can be supported through jointly-developed S&T for verification and through joint or international technical demonstrations and exercise.

### Historical approaches

The U.S. nuclear weapons laboratories have over 4 decades of experience developing nuclear detection methodologies and data management systems. These tools were first developed for domestic safeguards at the DOE nuclear facilities, then were advanced for international safeguards, nuclear emergency response, arms control and homeland security missions. The strength the labs bring to the nuclear detection for global security is fourfold: deep expertise in detection physics, classified knowledge of the evolving global nuclear threat scenarios, access to and capability to handle special nuclear materials for testing techniques against threat objects, computing tools for modeling, simulation, data analysis and management. Over the last 15 years DOE has funded S&T to support verification science for a number of initiative involving radiation measurements for arms control and fissile material disposition agreements.

Just as arms control and disarmament agreements build upon the nonproliferation regime, we technology providers build upon the instrumentation and algorithms we developed for international safeguards to meet the arms control mission needs. As a physicist I might be biased, but I contend that when it comes to monitoring dismantled weapons, the nuclear measurements are the easy part. What's tricky is providing confidence to the international community while protecting classified or sensitive information.

### Science-based tools being currently developed or tested

Clearly radiation detection measurements will be required for arms control treaties beyond new-START, for example to count ever smaller numbers of bombs and warheads deployed, in storage, or being dismantled—without revealing sensitive design information. Modeling and simulation play a pivotal role in the development and optimization of radiation detection systems. Models are needed to understand processes in the fabrication as well as in the operation of radiation detection systems. Crystal growth processes, material surfaces, and charge transport in semiconductors are examples of objects and processes where modeling is crucial to improving the performance and fabrication of detectors. An additional necessary component in the development and operation of radiation detection systems is Monte-Carlo simulations, which incorporate and are based on physics models of the instrument, the radiation, and the environment.

However, the problem is larger than radiation detection. S&T tools are being considered to support an end-to-end approach for monitoring and verifying non-strategic nuclear weapons. Many of the S&T tools currently being developed, tested or evaluated as potential ways to cooperatively verify NSNW under a future treaty focus on a specific element of the verification mission.



1. Warhead measurement: neutron and gamma-ray based nondestructive assay
2. Warhead verification: attribute measurements with info barriers vs. template matching
3. Facility monitoring: layered sensors, remote monitoring, persistent surveillance, muon radiography
4. Data assessment: big data\* analytics and crowd sourcing
5. Data authentication: quantum cryptography
6. Chain of custody: portal monitors, tags and seals, video surveillance

\*Big data refers to collections of data sets so large and complex that it is impossible to process them with current tools.

### **Gaps and Pipeline – S&T experts, facilities, and funding**

Over the last decade, experienced professionals in verification science have declined in number, and many of those engaged still tend to address the problem as an extension of approaches used in past treaties and agreements. It's not enough to understand the physics behind a radiation measurement technique. Because of classification issues associated with nuclear weapons cleared personnel and secure facilities are required. A wide array of next generation performers (other labs, contractors, and academia) is needed to address the full complexity of this problem space that calls for new, as well as improved, tools. Therefore there is a compelling need to reinvigorate the U.S. nuclear science and technology base, and research universities and national labs must address all safety, security, nonproliferation and economic issues which must be solved to ensure a sustainable nuclear technology enterprise to support arms control and other nuclear mission S&T needs.

To succeed in supporting the global treaties and verification and arms control regimes a scientist needs to experience in-field applications. Some efforts have been initiated to help rebuild the S&T workforce needed to support future treaty verification activities. DOE/NNSA/NA-22 has taken a step to rebuild a pipeline of scientists and engineers for nonproliferation and arms control missions. A team lead by UC Berkeley was awarded a 5-year \$25M grant to help build this workforce through a Nuclear Science and Security Consortium. Several participating universities are proposing to develop "minors," "concentrations" or "emphasis" in nuclear science and engineering. Through collaborations with the NNSA laboratories, some of the students and post docs in this program will be afforded unique opportunities to work with nuclear material, weapons components and classified weapons data. To further cultivate university-national laboratory collaboration, the "Affiliated Research Faculty" program brings in laboratory scientists to spend from several weeks to one year at participating universities at various levels of appointment, including visiting sabbatical appointments, adjunct faculty positions and, in the longer term, joint regular faculty positions. The University of California Office of the President uses a portion of its laboratory management fee, about \$20M per year, to fund joint positions between the UC campuses and the National Security NNSA Labs on a competitive basis.

Although the Nuclear Posture Review report prepared by the Obama Administration calls for R&D to support nuclear arms control treaty verification, no line item budget nor even dedicated program funding has been proposed by the administration for this important multi-year initiative, with dedicated funding for developing the key technology pieces, for creation of the operating systems that will be proposed for joint international use, and the cooperative experiments and trials with foreign nations. For example, while DOE/NNSA/NA-20 does entertain proposals for R&D to support arms control initiatives, they could pursue an international research and development program in automated monitoring and reporting systems supported by information barriers and authentication to enable more effective and extensive materials monitoring.

---

The nonproliferation and arms control community would benefit from a test bed to cover the full range of experiment, test, demonstrate, exercise, and training with nuclear weapons and components. Many facilities at DOE labs have been closed or limited in functionality (e.g., Rocky Flats, SuperBlock at LLNL and TA-18 at LANL.) Many experts believe that even with substantial investment in R&D the U.S. will likely see only marginal improvement in monitoring capabilities without a test bed. Over recent years there have been opportunities to measure weapons components in a mock treaty inspection type scenario in the UK, but more is needed in the U.S. Recently DOE renamed the Nevada Test Site to reflect a new, broader mission that focuses on nuclear security, but includes treaty verification. A test bed in Nevada for arms control S&T would enable treaty negotiations on non-strategic nuclear weapons. For example, trusted information barriers, capabilities for real-time process monitoring and in-field inspection and analysis capabilities could be developed and demonstrated.

Three years ago DoD Undersecretary Ash Carter formally commissioned a Defense Science Board (DSB) Task Force on assessing nuclear treaty monitoring and verification technologies. Mim John and Don Kerr chaired the task force, and they asked experts from LANL, LLNL and SNL to serve as advisors. An assessment of strategies for monitoring nuclear activities in both permissive and non-permissive environments and on our current technical capabilities and future requirements for successfully implementing those strategies was made. Over the past decade, ubiquitous information access and widespread observational tools are increasing inherent transparency. This DSB Task Force's report should be available soon.

### **Challenges/Summary**

In treaty verification our job as scientists is to develop tools that provide confidence—to the stakeholders in the U.S. and to some extent to the international community—that all parties are upholding treaty commitments.

---

## Day 1: Group 1 Discussion Notes

*Prepared by Jim Trebes*

### MORNING DISCUSSION

The initial discussion began with creating a definition of non-strategic nuclear weapons (NSNW). The working definition that resulted was any nuclear weapon not covered under the New START Treaty, i.e., any nuclear weapon except for an ICBM warhead, SLBM warhead or gravity bomber or air-launched cruise missile for delivery by a nuclear-capable heavy bomber.

Participants noted that the United Kingdom and France both consider all their nuclear weapons to be strategic and that neither country has tactical or NSNW.

The group quickly modified the scenario and discussed a modified version allowing non-deployed Russian NSNW to remain in declared sites west of the Urals. The existing Russian NSNW are believed to be in a non-deployed status and stored in fixed, secure storage locations, a number of which are “centralized storage sites” not located at air or naval bases. Some of the group acknowledged that if weapons are consolidated in “centralized storage facilities,” it makes little difference from an operational standpoint where these facilities are located; it is more important that weapons are not at operational bases close to the means of delivery. Permitting NSNW to be stored in sites “west of the Urals” would enable Russia to avoid the cost of creating new storage locations and the security risk of moving the weapons to these new locations.

For important political reasons, however, it is essential that Russia withdraw weapons from centralized storage sites located near the border with Latvia, Belarus, and Ukraine. Some participants also argued that if allowed to maintain NSNW west of the Urals, Russia should be asked to agree to some additional provisions. First, Russia should make some reductions in the NSNW stockpile to ensure a greater sense of balance and equity in the outcome, given the numerical imbalance in these forces and the significantly greater distance associated with relocating U.S. weapons. And second, to agree to a regime that would monitor all transfers out of relevant centralized storage sites to ensure that no weapons are moved to operational bases and any transfers are to dismantlement facilities.

The group also discussed briefly the possibility of an agreement that would capture all remaining U.S. and Russian nuclear weapons in a single ceiling, with select sublimits that would include a ceiling on NSNW—as a successor to the New START Treaty. Russian workshop participants argued that this was not a feasible approach, and not favored by Russia.

The group noted that challenge inspections could be required as part of any verification effort. The extent of where and how often was not determined.

The Russian government has asked for destruction of infrastructure for U.S. NSNW in NATO Europe as a precondition for any negotiation on limiting NSNW. There was a discussion about what is the definition of this infrastructure. The reality is that, at least for temporary deployments of limited number of NSNW, no fixed infrastructure is required, and storage bunkers, etc. for conventional bombs may be very similar to bunkers, etc. for nuclear weapons. The group was unable to develop a definition or a method of compliance with the Russian desirement.

The group noted that the movement of Russian NSNW east of the Urals would cause concern for Asian governments. There was also some discussion of possible effects on neutral countries such as Sweden, Ireland, Switzerland, etc. No conclusion was reached. The question of what defines NATO territory was asked with no conclusion.

The group was unable to develop a definition of a deployed warhead. It was noted that if the New START definition is applied, both the U.S. and Russia have zero deployed NSNW.

The group noted that maintaining a capability for the temporary re-deployment of U.S. NSNW to Europe (assuming a ban on permanent basing) will require a credible operational plan and exercise program; certainly Congress would demand this. Some suggested that the agreement would need to be explicit regarding the circumstances under which re-deployment would be permitted. This resulted in brief discussions about the definition of basing, permanent basing, and temporary basing. No conclusion was reached.

The issue of ship-based weapons came up. It was noted that neither the United States nor Russia currently deploys NSNW to sea.

---

The group noted that, in order to get the agreement in the scenario, there would presumably also be limits on strategic weapons, missile defense, as well as on conventional forces, and assumed that this had been dealt with in the executive discussion creating the agreement scenario. This NSNW agreement would need to be executed in a holistic effort with agreements on other issues.

There was significant discussion on how the scenario would affect some NATO members' security outlook and posture. Countries such as Turkey face growing threats outside the NATO region, such as a possible nuclear-armed Iran in the near future. Turkey perceives that the NATO nuclear umbrella enhances its security. There was a concern that removal of U.S. nuclear weapons would be perceived as a reduction in security. Possible measures such as providing Turkey with advanced conventional weapons and missile defense capabilities were discussed as possible mitigations to Turkish concerns.

The goal of the agreement was brought up as an issue. The group was unclear on the goal of the agreement and what was trying to be achieved. However, some participants noted that this agreement would preserve the current status of "zero deployed NSNW" and make it verifiable. There was a brief discussion toward the very end about the motivations and objectives of those who are looking for some type of understanding with the Russians on NSNW: Russian NSNW as a source of anxiety—for "new" NATO allies who fear nuclear coercion, and for Western strategists who see the numerical disparity as inconsistent with overall strategic stability. Russian objectives seem reasonably clear: remove U.S. nuclear weapons from Europe.

The group noted that the agreement could raise some questions about where U.S. and Russian NSNW could be deployed (leaving aside any provisions the agreement might make with respect to temporary re-deployments to excluded territory). Could NSNW be deployed under this agreement to non-NATO, non-Russian territories considered part of Europe (even though it is difficult to imagine such a circumstance)? Presumably an agreement that simply creates a geographical exclusion zone in most of Europe would not affect the ability of either side to deploy NSNW elsewhere. The scenario makes no reference to limiting NSNW to U.S. and Russian national territory, an important consideration in light of U.S. security commitments in other regions. How is the agreement affected if a currently non-nuclear country develops nuclear weapons?

The group noted there will need to be reciprocity in any inspection/verification regime. Requiring the inspection of Russian storage sites in Europe will trigger a Russian requirement for inspection of U.S. sites, but under the scenario they would be only in the U.S. The group also noted multi-national inspection teams, if provided for in the agreement, are an issue in that under the Non-Proliferation Treaty non-nuclear countries are not supposed to receive nuclear weapons information.

## **AFTERNOON SESSION**

The motives for Russia accepting the agreement were brought up. Why would Russia agree to this? Is it because it is part of a broader set of agreements that does touch key areas such as the balance of conventional forces in Europe missile defense or U.S. reserve strategic weapons?

Should the agreement have broader geographic scope? Should it extend from Vladivostok to Vancouver, thus capturing all U.S. and Russian territory? Should all NSNW be put in a non-deployed status in centralized storage facilities?

The group discussed inspection. Former storage sites for nuclear weapons and operational bases will need on-site inspections. Temporary movements and training exercises involving NSNW will need notification and could require monitoring. The use of a perimeter/portal monitoring system on allowed storage sites was advocated by some in the group and believed to not be necessary by others, who believed that inspections at operational bases to verify absence of nuclear weapons there would be sufficient.

The group believed a data exchange on numbers of NSNW would be useful, although some argued that it is not necessary and may complicate the arrangement. Every site that stored or had once stored NSNW (in deployed or non-deployed status) would need to be declared. A question of implementation was raised—do you verify a withdrawal process or absence of weapons?

Tags were brought up, but no clear outcome over their use was reached. It was noted that a much more cooperative relationship will be required to get to a point where tags on nuclear weapons would be possible.

---

It was noted that there may be NSNW stored at sites alongside strategic warheads. How do you tell them apart and how do you verify that a New START declared site is not being used to store NSNW was raised as an issue. It was noted that, if an agreement covered all non-deployed nuclear weapons, both strategic and non-strategic, it might not be necessary to tell them apart.

What are the consequences of cheating? What are the motives for cheating?

What will be the cost of the agreement and who will pay these costs?

Consolidation and elimination of facilities within NATO is a challenge due to the politics of basing nuclear weapons: if one state stops hosting U.S. NSNW, that could increase political pressure on other NATO allies to no longer host NSNW.

The group briefly discussed the need for a governing body for the agreement. This would be the venue where concerns get raised and adjudicated.

The political need to shut down Russian NSNW storage sites near NATO borders and relocating Russian weapons to storage sites west of the Urals but further removed from NATO borders was discussed.

Do you need to destroy former sites that held NSNW? Are random inspections enough? Or would sufficient elimination of a former site's infrastructure suffice to obviate inspections there?

What are the verification requirements that are sufficient to enable U.S. Senate approval, which may go beyond what arms control experts deem as necessary?

The whole question of whether the agreement changes NATO from being a nuclear alliance to an alliance with some nuclear powers was raised. Do you need a new European security architecture?

Russian motive for agreement—get agreements on other issues.

European motive for agreement—don't have to pay upcoming costs for modernizing delivery aircraft and, for some, get rid of NSNW on their territory.

The issue of whether NATO is on a course to unilaterally eliminate NSNW from Europe by default was raised: when Germany retires the Tornado aircraft, it will no longer have a nuclear-capable aircraft and U.S. NSNW will be withdrawn, which could make it difficult politically for the Netherlands and Belgium to continue hosting U.S. NSNW. Would this cascade to the withdrawal of all U.S. NSNW? Will the F-35 be procured by allies? NATO may find itself with no non-U.S. delivery systems for NSNW in 10 years.

The question of the value of NSNW was raised. If they have no military value then why do they have political value? It was noted that the U.S. does not see NSNW in Europe as necessary to deter Russia but does see a need to reassure allies, particularly those in Central Europe who see NSNW as evidence of U.S. commitment.

Do you extend the New START counting procedures to this agreement? Do you count all weapons? Do you use a sampling method?

Verification issue—the human capital required to develop and operate complex verification technologies is dwindling. Where will the needed people come from if treaties emerge requiring complex verification?

The need for U.S. Congress agreement on any potential treaty or agreement on NSNW was stressed. This will require a significant effort both on the part of the Administration, NATO, and those foreign capitals host to the affected weapons to engage authorizers and appropriators and convince them to allow any changes. The ability to gain U.S. congressional participation is complicated by changes in congressional leadership on nuclear weapons issues.

Final comment from afternoon session:

Those NATO countries that currently host U.S. NSNW don't want them. Those NATO countries that do want them in NATO countries cannot have them on their territory.



---

## Day 1: Group 2 Discussion Notes

Prepared by Clark Murdock

### MORNING DISCUSSION

The Hypothetical Treaty stipulated only that the U.S. and Russian Presidents agreed to remove all non-strategic nuclear weapons (NSNW) from the Atlantic-to-the-Urals and to a ban on any future permanent basing of U.S. and Russian NSNW in this exclusion area. To this scenario, Murdock in his opening brief to Group 2 members added several elements:

- NSNW defined as any nuclear weapon not captured under the terms of the New START treaty.
  - This definitional stipulation essentially took this issue off the table.
  - Total inventory consists of deployed and non-deployed strategic weapons, deployed (of which there are not many, if any on peacetime basis) and non-deployed NSNW, plus the queue of warheads awaiting dismantlement (which could include weapons that could become operational relatively quickly).
- This agreement is part of a broader agreement on overall reductions, including sub-limits on NSNW.
- This agreement includes a verification regime to confirm removal and continued absence of NSNW and compliance with NSNW sub-limits.

Group 2 participants immediately noted that the Murdock additions changed the scenario from a “narrow” focus on ensuring that NSNW left (and did not return) to a “broader” focus on total stockpiles of weapons and sub-limits on types of weapons within that total.

- Although the data on numbers, types and locations of NSNW are classified, the following force structures were often cited in the discussion.
  - Total Russian-U.S. NSNW stockpile: 2000 to 500.
    - » U.S. has 200 gravity bombs at six sites in five nations.
    - » Russia has ~1300-1500 weapons (of many different types at 15 sites (seven national stockpiles and eight at operational bases).
- New START capped number of operationally-deployed strategic weapons, although bomber counting rules (each bomber counts a one weapon) would add 200-300 weapons to the actual numbers.
  - Various proposals for the next round of New START talks could lower the total of 1550 deployed strategic weapons to 900-1100.
- Verification of the “narrow” NSNW agreement would be difficult; verification of a total limit on nuclear weapons, including sub-limits, much more so.
  - Much easier to verify delivery systems and attribute weapons loadings to them.
  - NSNW particularly difficult to verify because many of them are quite small and could require opening containers to verify numbers and types of weapons. Moreover, any “hidden arsenals” could be quickly moved into operational status, either from within the exclusion area or from outside.
    - » Not just an issue of verifying that previously declared NSNW storage facilities are “empty.”
      - » May have to destroy facilities to prevent re-use.
    - » Verification of a NSNW agreement would involve high transparency (on numbers, types and locations) of weapons, as well as on-site inspections to ensure compliance with declared statements.
      - » In order to address the “hidden arsenal” problem, would also have to include Suspect Site Inspections (presumably no-notice) regime.
    - » Since the Russians are very likely to retain strategic weapons storage facilities west of the Urals (too expensive to do otherwise), verification would have to address the issue of co-mingling of Russian strategic and non-strategic weapons.

- Verification is not absolute, but a continuum that depends on the standard being applied, as well as the level of trust between the parties.
  - » “Adequate” verification: sufficient to ensure that no militarily-significant cheating has occurred.
  - » “Effective” verification is stronger than “adequate,” but how much stronger was not defined.
  - » Standard of verification applied by the U.S. Senate likely to be more absolute.
  - » If the continuum of verification ranges from one to ten, the Biological Weapons Convention (BWC) is a “1-2” and the 150-KT Test Ban Threshold Treaty (TBTT) is a “8-9”.
- Accepting the “narrow” NSNW agreement required a “suspension of reality” or a “suspension of disbelief,” because most of the Group 1 participants did not believe that either the U.S. or Russia would agree to it, albeit for different reasons. For instance, one participant said sustained engagement to build consensus within NATO would take years and be very difficult to achieve. Another participant said NSNW feature prominently in Russia’s strategy and doctrine for conventional conflicts, and this “narrow” agreement would require that it abandon both, a development the participant judged to be unlikely.
  - Impact on Asia would be extremely negative for both U.S. and Russia.
    - » “China will go nuts.”
      - » Perception that Russia has joined the U.S. in its “encirclement” of China will lead them (at a minimum) to accelerate their strategic nuclear weapons development.
      - » Could be end of U.S. effort to shape the evolution of a rising China into a “responsible stakeholder.”
    - » U.S. Asian allies (particularly Japan and ROK) would react very negatively.
      - » Several participants noted the negative reaction to the proposed INF treaty led the United States to undo the U.S. and Presidential agreement reached at Reykjavik and that Asia is less stable today than it was then.

Group 2 participants were divided on the impact of a “narrow” agreement in Europe:

- Some participants believed that U.S. weapons forward-deployed in Europe no longer had any military or political utility and should be removed.
- Others noted that NATO had recently determined, both in its 2011 Strategic Concept and its 2012 Defense and Deterrence Posture Review (DDPR) that U.S. forward-deployed NSNW was critical to NATO remaining a “nuclear alliance” and to nuclear burden-sharing between the Allies.
  - In their view, the presence of U.S. NSNW in Europe is a powerful political symbol whose removal could lead to a gradual erosion of the U.S.-European security relationship.
- One of the “unintended consequences” of the “narrow” NSNW agreement would be its interaction with the ongoing U.S. debt crisis and its defense drawdown:
  - Political support for the B-61 Life Extension Program would collapse.
  - DoD can’t afford to take the ameliorative actions (e.g., increase conventional forces in Europe) to strengthen assurance.
    - » U.S. Army already plans to go from 4 brigade combat teams (BCYs) to two and could go further.
- “Narrow” NSNW relocation agreement could undercut non-proliferation goals in both Asia (Japan and ROK) and Europe (Turkey).
  - “Narrow” agreement would also be unstable, because NSNW could be rapidly reintroduced into the theater, although it probably would be “harder” (both politically and in terms of escalation control) for the U.S. to deploy them from CONU.S. than for Russian (from east of the Urals).

The morning discussion concluded by defining the conditions/context under which the U.S. and Russian Presidents could agree to remove all NSNW from the Atlantic-to-the-Urals:

- Russian strategic weapons would not be leaving the exclusion zone.

- This agreement is part of a broader agreement on overall U.S. and Russian nuclear weapon stockpiles with a sub-limit on deployed strategic weapons.
  - The U.S. and Russia will want to have different mixes of non-deployed strategic weapons and NSNW. They have reached agreement on limits on deployed strategic weapons (albeit with counting rules) and might reach an agreement on total inventory, but are unlikely to agree to equal sub-limits on either non-deployed strategic or NSNW.
  - An issue that was identified in passing but not discussed in any detail was the asymmetry between the active Russian nuclear weapons production complex and the largely inactive American one.
  - Several participants noted that achieving this “broad” agreement would represent a huge advance in arms control and disarmament and they would be willing to jettison the “narrow” agreement in favor of this much more ambitious endeavor.
- This agreement would require unprecedented levels of transparency about U.S. and Russian nuclear stockpiles.
  - The dismantlement queues will be swollen even further by another New START agreement and will raise verification concerns.
- Any agreement on removing NSNW from the Atlantic-to-the-Urals that met these three conditions would be based on a fundamentally different U.S.-Russian relationship that exists now.
  - Group 1 participants, however, were divided on whether the trust implicit in reaching this agreement could or would spill over into the definition of what constitutes adequate or effective verification.

## AFTERNOON DISCUSSION

Re-visited the discussion of verification—“how verifiable does it have to be”—and the “hidden arsenal” problem.

- Does addressing the risk of “non-declared” require anywhere, anytime, no right of refusal?
- It’s always “verifiable with some level of risk.”
  - National Technical Means can reduce the risk, but not eliminate it.
- The importance of Suspect Site Inspections to a politically-credible verification regime was underscored by several participants.
  - As one participant noted, verification is “mutually assured confidence” and the standards for that vary with the context.
  - Several participants argued that Suspect Site Inspections create unique challenges as well, with tit-for-tat challenges from both countries, “fishing expeditions” for classified data unrelated to the agreement, and political pressure if one side is caught violating the agreement.

The negative Asian effects of NSNW agreement can be mitigated:

- If the relocation of Russian NSNW was away from NATO’s borders but still west of the Urals.
  - This raised the issue of why the U.S. would agree to remove its NSNW from Europe in return for Russian consolidation, but not removal, of NSNW from the exclusion area.
- If the “narrow” agreement were part of a global limit on U.S.-Russian stockpiles, the limits were quite low (unspecified), this would help with both the Chinese and non-proliferation.
  - One participant noted that this might not help with the Japanese who are most concerned by China.

- 
- The United States would need to work hard to maintain assurance of Japan and South Korea. Several participants suggested that this would require a more visible U.S. nuclear presence in Asia, such as temporary deployments of nuclear capable bombers or SSBN port calls.

Murdock then proposed a number of statements in order to get feedback from the group:

- If the U.S. removes its NSNW from Europe, would NATO remain a “nuclear alliance” or would NATO become an “alliance with three nuclear powers in it?”
  - There was a sharp division of opinion on this issue, with some arguing that the nuclear planning mechanism could continue and U.S. conventional presence in Europe (e.g., Ramstein AFB) is sufficient for “coupling” and assurance and others arguing that U.S. NSNW represent the ultimate symbol.
- If U.S. and Russia were to pursue a global limit on nuclear limits with a sub-limit on deployed strategic weapons (under New START counting rules), it should not include regional exclusion limits on NSNW (the “narrow” agreement).
  - There was considerable, but not unanimous (in part because attendance was down) agreement.
  - The goal of striving for a “broad” agreement had considerable support.
    - » As one noted, “If you do something, make it useful.”

---

## Day 2: Joint Session Notes

Prepared by Vince Manzo

### THE GEOGRAPHIC BAN (NO NSNW STATIONED ON NATO TERRITORY IN EUROPE AND RUSSIAN TERRITORY WEST OF THE URAL MOUNTAINS)

In addition to concerns about reactions in Asia and the effects on NATO that participants discussed in detail during the first day, several other aspects of the geographic ban were discussed during the second day:

- One participant argued that keeping the infrastructure for temporary U.S. NSNW deployments in Europe would be necessary, while another argued that Russia would only accept this agreement if it included dismantlement of the infrastructure.
- Several participants compared the challenge of temporary re-deployments to the alerting/de-alerting challenge; once the NSNW are no longer in Europe, bringing them back would be escalatory and possibly operationally dangerous if the bases are not equipped and trained to handle them. Many participants agreed that it would also be politically challenging for NATO.
- The challenge of verifying that Russian NSNW remain at their declared sites, regardless of which side of the Ural Mountains, was a recurring point, although some were more optimistic than others: several participants emphasized that Russia could move NSNW around very quickly, while others stressed that even though 100% certainty of compliance is impossible, a verification regime can narrow margin of uncertainty to acceptable levels and perhaps be effective enough to deter cheating.
- Several participants argued that tagging NSNW with unique identifying numbers, similar to this method employed for strategic weapons in the New START Treaty is feasible and would facilitate verification at declared sites.
- Consolidating Russian NSNW in several storage facilities west of the Urals but farther from Baltic States was another idea; however, several participants questioned whether the United States would agree to remove all its NSNW from Europe in exchange.
- The value of an agreement over the location of NSNW was another source of disagreement. Most participants acknowledged that it would have symbolic value, but many said the political costs would outweigh that. On the other hand, one participant argued that currently Russian NSNW are, for all purposes, in storage locations rather than deployed, and an agreement codifying this situation would be important. Several other participants said Russia could quickly deploy NSNW in a crisis regardless of an agreement.
- Several participants argued that if physical security of NSNW from theft was the concern, an agreement moving them to different locations would not be the most efficient means for addressing that potential problem.

### The Big Deal

As with the first day, the potential for a “big deal”—an ambitious treaty—with a limit on nuclear stockpiles and a sub-limit on deployed strategic warheads was discussed; for instance, 2500 weapons with a sublimit of 1100 deployed strategic. Several participants reiterated that Russians perceive their security as requiring a larger inventory of NSNW, whereas the United States prefers to have more non-deployed strategic warheads on hand as a hedge. An agreement giving each country the flexibility to determine the composition of its stockpile under that general limit reflects this reality and allows both to reduce their overall numbers of nuclear weapons and deployed strategic nuclear weapons. Such an agreement would provide leverage for bringing other nuclear weapon states into discussions about transparency and arms control.



- 
- Several participants supported a variant of this deal that would include an agreement between the United States and Russia to further ratchet down the central limits in the New START Treaty and agree to a regime of transparency and confidence building measures on NSNW and non-deployed strategic warheads. These could include declarations about numbers and locations of NSNW, as well as consultation and joint-work on how they would verify NSNW and non-deployed strategic warhead declarations.
  - One participant disagreed with the most of the group on the question of whether an agreement should allow Russia to continue maintaining many NSNW. Rather than keeping them in central storage, complete dismantlement of NSNW should be the goal of an agreement.
  - One participant emphasized that any arms control agreement has physical and psychological effects. The narrow scenario the workshop posited would have physical effects that Russia could easily reverse, but the negative psychological effects in Asia could be profound and the positive symbolism of the agreement would be modest in comparison. Every agreement has costs and complications, the participant concluded, so we might as well work toward an agreement that has a profound positive effect (i.e., the big deal).

#### **Cooperation on Joint Verification Technologies**

One participant described the use of radiation equipment to verify the absence of warheads on missiles as part of New START. These sampling capabilities are important and a lot of work remains; the participant suggested that the United States and Russia agree to jointly develop radiation technologies in parallel to any new arms control negotiations.

- One participant suggested that the P-5 cooperate on these types of verification technologies as part of fulfilling Article 6 obligations under the NPT.

#### **Russian Motivations**

Periodically the discussion would center on Russian motivations to reach another arms control agreement with the United States. Almost all the participants seemed to agree that the United States and Russia would need to reach an understanding or agreement on the missile defense issue before they could make progress on further nuclear arms control, although, to be clear, no one argued that the United States should accept a binding limit on missile defense.

- Several participants argued that Russia is aware of fiscal and political challenges surrounding the B61 modernization in the United States and follow-on nuclear-capable aircraft acquisitions in Europe. Recognizing this challenge, some participants asserted that Russia will simply wait for NATO's nuclear capability to atrophy rather than trade anything away in an agreement. Other participants argued that if disarmament through atrophy is a serious possibility, the United States should strive for an agreement while these assets still confer some leverage.
- One participant suggested that future workshops should include unclassified briefings on recent developments in Russia's NSNW capabilities and assessments of the most likely Russian cheating scenarios in an agreement on NSNW.

---

### **European Perspective**

Several participants noted that the discussions focused on U.S. and Russian concerns even though an agreement on NSNW would affect European security. For example, one participant said that France and the U.K. would be on the periphery of this agreement and instead Sweden's perspective would be vitally important. All participants agreed that any agreement affecting NATO's nuclear posture, especially one withdrawing U.S. nuclear weapons from Europe, would require deep consultations within the alliance. Several participants argued that a future workshop in Europe, to allow for more European participants, would be worthwhile.

### **Suspect Site Inspections**

The need for suspect site inspections to verify the absence of undeclared NSNW was raised several times. Several participants said this would contribute to deterring Russian cheating. Several participants warned that this would open the door to "fishing expeditions" for classified data unrelated to the treaty, while at least one participant said this concern is exaggerated. For future workshops, one participant suggested categorizing the different types of Russian storage facilities that might house NSNW, such as declared sites, sites for strategic-range weapons, conventional facilities, and "sleeper" sites. Then participants could work through the different approaches to verifying whether NSNW are housed at the different sites, thus identifying the degree of compliance uncertainty as well.





