GLOBAL DIALOGUE ON NUCLEAR SECURITY PRIORITIES[1]

NON-PAPER: BUILDING INTERNATIONAL CONFIDENCE IN THE SECURITY OF MILITARY MATERIALS

KEY POINTS

- Military materials are estimated to comprise **85% of all global weapons-usable nuclear materials**.
- As a category, these **materials are quite diverse** and include material in different forms, in different facilities, and in different uses. Not all of these forms and facilities are inherently sensitive in nature.
- The 2014 Nuclear Security Summit reaffirmed **"**…the fundamental responsibility of States, in accordance with their respective obligations, to **maintain at all times effective security of all nuclear and other radioactive materials, including nuclear materials used in nuclear weapons**." Yet today, the vast majority of weapons-usable materials remain outside of nearly all the existing international nuclear security mechanisms, and no existing mechanism addresses military material specifically.
- Current and past nuclear security cooperation experiences with sensitive nuclear materials and at sensitive nuclear facilities demonstrates that **nuclear-armed states should be able to explore and implement measures to provide confidence** about the security of military material.

Background

In the 2014 Nuclear Security Summit (NSS) communiqué, states reaffirmed the "fundamental responsibility of States, in accordance with their respective obligations, to maintain at all times effective security of **all nuclear and other radioactive materials, including nuclear materials used in nuclear weapons**, and nuclear facilities under their control." States, therefore, recognized the importance of security around all weapons-usable nuclear material.

Today, the vast majority of weapons-usable materials remain outside of any of the existing international nuclear security mechanisms. These materials are not covered by International Atomic Energy Agency (IAEA) nuclear security guidelines or the Convention on the Physical

[1] Through the Global Dialogue on Nuclear Security Priorities, leading government officials, international experts, and nuclear security practitioners engage in a collaborative process to build consensus about the need for a strengthened global nuclear security system, how it would look, and what actions would be needed at the Nuclear Security Summits and beyond. The Global Dialogue discussions are conducted on a not-for-attribution basis; where individuals and governments are free to use the information obtained during the meeting, but that information should not be attributed to a specific individual or government. For more information: http://www.nti.org/about/projects/global-dialogue-nuclear-security-priorities.

Protection of Nuclear Materials (CPPNM) and its 2005 Amendment. Military materials[2] are not routinely subject to best-practice exchanges, information sharing, peer review, or other voluntary mechanisms to build confidence in the effectiveness of their security.

To make real the 2014 Summit communiqué commitment to secure "all materials," states with military materials should commit to secure military materials to the same or higher standards as comparable civilian materials, including through the application of best practices and consistent with the IAEA's nuclear security guidelines. States should also think creatively about how to implement nuclear security standards and best practices in a way that builds confidence in their effectiveness while protecting sensitive information.

Key questions for discussion at the Global Dialogue on Nuclear Security Priorities include:

- Given the importance of building international confidence in the security of military material, both for those countries with and without military materials, what **types of activities or information could provide confidence** in the security of military materials, while protecting sensitive information?

- What is the **range of activities and past experience that build confidence** in the security of military materials? Can these be expanded and modeled further?

This paper provides some clarity about what is meant by "military materials" and why it is important to include these materials in a global nuclear security system. It also provides several options/examples of voluntary confidence-building measures that can be applied without compromising sensitive information.

Why Comprehensiveness Matters

As of the end of 2011, the global stockpile of weapons-usable material was estimated to include 1,440 metric tons of highly-enriched uranium (HEU) and almost 500 metric tons of separated plutonium.[3] Nearly all HEU and approximately half of the plutonium that has been produced globally remains outside civilian programs and therefore is categorized as "military material." If the purpose of the nuclear materials security system is to ensure that all nuclear materials are secure from unauthorized access and theft and that nuclear facilities are secure from sabotage, then the system will not be effective without ensuring that these large quantities of materials are under effective security. Even a small fraction of 1% of these materials would be sufficient to fabricate a crude nuclear device that, if used, would have catastrophic consequences that would ripple around the globe.

[2] "Military materials," as used in this paper, refers to all weapons-usable nuclear materials outside of civilian programs.

[3] *Global Fissile Material Report 2011: Nuclear Weapon and Fissile Material Stockpiles and Production*, Sixth annual report of the International Panel on Fissile Material (IPFM), January 2012, pp. 2-3.

Many believe that military material and other non-civilian materials are under military protection, and they assume that such materials have stronger security than those in civilian programs. However, recent events demonstrate that assumption is not necessarily the case. For example, in the United States, much of this material is in the custody of the U.S. Department of Energy and is protected by civilian security contractors. Past incidents—such as the serious security breach by three peace activists of the HEU storage facility at the Y-12 National Security Complex in Oak Ridge, Tennessee, in 2012 containing military HEU—raise concerns about the security of this material.

Even material in the custody of the military has not always been properly secured. In 2007, six cruise missiles, each loaded with nuclear warheads, were mistakenly placed on a U.S. Air Force heavy bomber at Minot Air Force Base in North Dakota and transported to Barksdale, Louisiana. The nuclear warheads were not reported missing from the storage bunker and remained mounted to the aircraft for a period of 36 hours. During this period, the warheads were not protected by mandatory security precautions for nuclear weapons. More recently, in 2013, U.S. nuclear missile launch officers were found sleeping with a blast door open to their missile launch control capsule. These incidents highlight that the security of military materials should not be taken for granted and should not always be assumed to be stronger than those in civilian programs.

Such incidents are not limited to the United States. In 2013 in the United Kingdom, as many as 50 U.K. Defense Ministry law enforcement personnel were under investigation for sleeping on the job and incomplete patrols at the Atomic Weapons Establishment in Burghfield, Berkshire, a U.K. military site where nuclear warheads are constructed, maintained, and disassembled.[4]

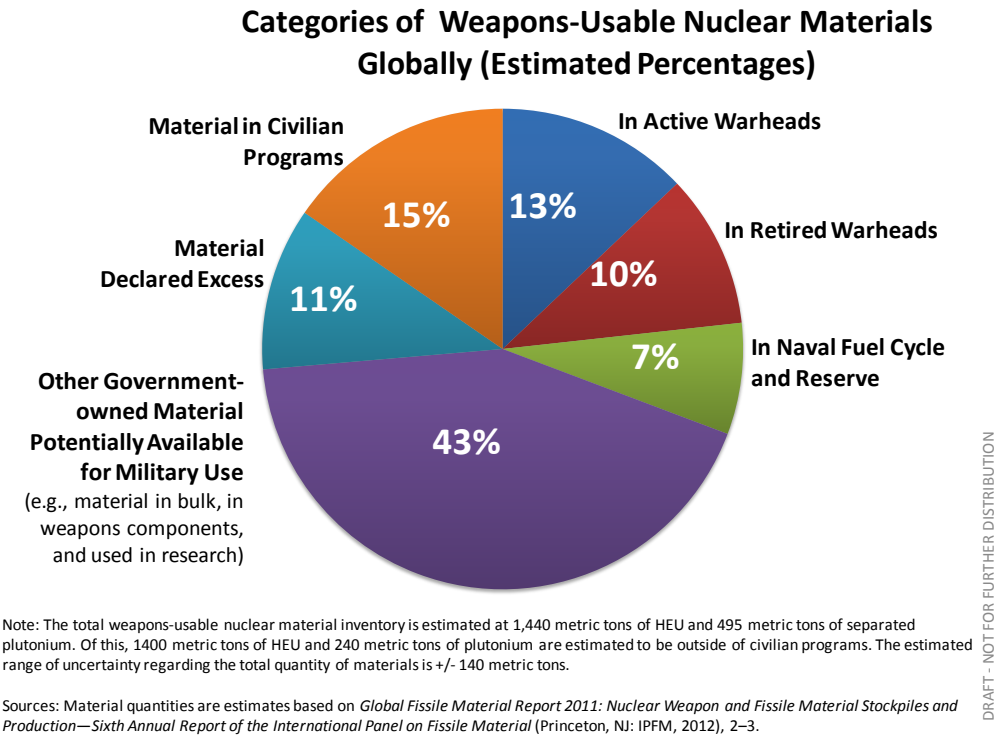
Types of Military Materials

Approximately 15% of total quantities of HEU and plutonium globally are used in civilian programs, based on publically available information. There is a common misunderstanding that all of the remaining 85% that is "military" material is used for nuclear weapons programs (either in assembled nuclear weapons or weapons components). Yet, "military materials" are quite diverse and comprise material in different forms, in different facilities, and in different uses. As estimated percentages: 13% is in active warheads; 10% is in retired warheads awaiting dismantlement; 11% is in material that has been declared excess to weapons needs; 7% is material associated with naval propulsion; and the remaining 43% includes other government-owned material potentially available for military use (e.g., material held, processed, or used in bulk form, in weapons components, and used in research). The percentage breakdown of this last category is ill-defined because of the lack of publicly available data in some areas.

[4] Stephen I. Schwartz, "Catalogue of Nuclear Security Incidents Regarding Weapons-Usable Nuclear Materials in Military or Other Non-Civilian Use," commissioned by the Nuclear Threat Initiative, December 2013.

Figure 1 below shows categories of weapons-usable nuclear material globally by estimated percentages. Note that the majority of this material is in Russia and the United States. However, all states with military material have the same responsibility to build the confidence of others in the effectiveness of their security arrangements for military materials.

Figure 1



Note: The total weapons-usable nuclear material inventory is estimated at 1,440 metric tons of HEU and 495 metric tons of separated plutonium. Of this, 1400 metric tons of HEU and 240 metric tons of plutonium are estimated to be outside of civilian programs. The estimated range of uncertainty regarding the total quantity of materials is +/- 140 metric tons.

Sources: Material quantities are estimates based on *Global Fissile Material Report 2011: Nuclear Weapon and Fissile Material Stockpiles and Production—Sixth Annual Report of the International Panel on Fissile Material* (Princeton, NJ: IPFM, 2012), 2–3.

Options for Building Confidence in the Security of Military Materials

States have been reluctant to share any information with respect to materials used for military purposes due to concerns about the need to protect sensitive classified information. However, not all material is in sensitive form or at sensitive locations. In addition, even for sensitive material and sites, past experience has shown that well-designed mechanisms for sharing information that simultaneously build confidence while protecting information are indeed possible. For instance, cooperative programs between states—particularly between the United States and Russia—have demonstrated tangible measures over twenty years to build confidence in the security of these materials **without compromising sensitive information**. These include the following:

- the Cooperative Threat Reduction (CTR) program, which included access to Russian nuclear warhead storage facilities under the control of the Russian Strategic Rocket Forces (SRF) and the Russian Ministry of Defense (MOD);
- the Material Protection, Control, and Accounting (MPC&A) program, which includes

regular access to provide security upgrades at Russian sites where HEU and plutonium are stored;

- the U.S.-Russian Plutonium Production Reactor Agreement (PPRA), which included access to U.S. and Russian facilities to ensure that shut-down plutonium production reactors in both states did not resume operation, as well as monitoring measures on weapons-usable plutonium in storage; and
- the U.S.-Russian Highly Enriched Uranium (HEU) Purchase Agreement and associated "transparency measures" as defined in the agreement.

It is particularly noteworthy that under the U.S.-Russian HEU Purchase Agreement, in order to provide confidence that HEU was from dismantled Russian nuclear warheads and not other sources, U.S. experts received routine access to sensitive Russian facilities (such as Seversk and Mayak) to inventory containers holding weapons-grade Russian HEU and to conduct radiation measurements on those containers to determine the enrichment of weapons-grade HEU. Over a twenty-year period, more than 40,000 such measurements were routinely conducted without disclosing sensitive information. Building on these efforts, the international community must continue to think creatively about how sensitive information can be protected while still finding ways to build confidence in the effectiveness of their security arrangements for military material.

As noted previously in Figure 1, some military materials include materials which are not used in nuclear-weapons programs, for example, materials used for research or in non-sensitive bulk forms. A first step to building confidence in the security of all military materials could be for states to consider measures that address the subset of these materials that are less sensitive. As part of this effort, it would be very beneficial if states could undertake an initiative to disclose information on each of the categories in Figure 1. In particular, nuclear-armed states could agree to disclose aggregate data on each of the different categories of weapons-usable nuclear materials as part of a transparency or confidence building initiative.

Some examples of steps that states with military materials could take are listed below. There are several options that states could pursue through the Nuclear Security Summit. Some of these could be incorporated into a "gift basket" by a combination of nuclear-armed states or could be announced in National Progress Reports at the 2016 Nuclear Security Summit.

The draft concepts offered below represent a range of possible confidence-building mechanisms, meaning they vary in the number of parties that might participate and how much information is shared. Steps for increasing confidence in the security of military materials could comprise a variety of unilateral, bilateral, and multilateral commitments and activities. Each of the options described below provides varying levels of confidence. Therefore, it is critically important to discuss and evaluate which mechanisms really matter for building confidence in the overall effectiveness of the system.

Accounting: One mechanism to increase confidence is to demonstrate that a regular accounting/auditing process with respect to these materials takes place. States could also work to share best practices for accounting.

Remote Monitoring: Specific observable measures such as remote monitoring and video confirmation can be used to build confidence in the security of certain materials. For example, remote monitoring has been very effectively used by the IAEA in South Africa for many years to provide real-time continuous monitoring of South Africa's weapons-grade HEU in storage without disclosing any sensitive information. Other states could explore this approach to providing confidence to others in the security of their military materials.

Certification: The development of a certification program demonstrating that nuclear-armed states' security professionals have all participated in internationally recognized training programs could raise confidence in the security of all materials under their purview, both civilian and military materials. States could require such certification of the contractors or government personnel employed to protect government sites. The World Institute for Nuclear Security (WINS), through the WINS Academy, has already developed an on-line certification program for nuclear security management. Certification could be supported by the IAEA, Centers of Excellence, trade groups, or other professional security organizations.

Peer Review: Peer review is an evaluation of processes or practices that uses the independence of the reviewers to make an impartial assessment of current arrangements and recommendations for improvement. In the civilian context, states can request a peer review of their nuclear security arrangements from the IAEA through its International Physical Protection Advisory Service (IPPAS) and other review missions. Though an IPPAS mission or other IAEA review may not be appropriate in the context of military materials, the concept of peer review, whether bilateral or multilateral, can apply to military materials if designed to protect sensitive information. By hosting a peer review mission by a recognized and competent group of experts, a state demonstrates a commitment to strengthening its nuclear security through external review, which in turn builds international confidence in its nuclear security system.

Trusted Agent: Where granting access to sites containing nuclear materials, particularly to nationals from other states, is not possible, especially for facilities with weapons and components, confidence in the security of these materials (while acknowledging classification sensitivities) could be developed through the use of a "trusted agent," a national of a host state, or trusted ally of a host state, who—by force of scientific reputation, standing, and training in security matters—could be relied on to certify the appropriateness and adequacy of the host state's security controls. Such an arrangement might prove valuable if it could be developed to gain confidence that military materials in nuclear-armed states are under adequate control. Nuclear-armed states could also certify security effectiveness through an accredited certification process and convey the certification status to non-nuclear-weapon

states, reducing concerns about the spread of nuclear weapons information.

Bilateral/Multilateral Arrangements: States can work with bilateral partners to cooperate on confidence-building measures related to each other's security. As mentioned previously, CTR and other U.S.-Russian cooperation programs, like the MPC&A program, the U.S.-Russian Plutonium Management and Disposition Agreement (PMDA), and the U.S.-Russian HEU Purchase Agreement, demonstrate both the value of bilateral mechanisms to improve security and build confidence and that this is possible without compromising sensitive information. The United States and Russia are in unique positions to encourage other states to take part in similar arrangements and share their experience cooperating together. In addition, states can expand bilateral efforts to include others states. For instance, efforts are underway between the U.S.-Russia-UK and the UK-France-U.S. related to the security of military material. These efforts should be continued and expanded.

Summit Commitment to Increased Standards of Security: At the 2016 Nuclear Security Summit, nuclear-armed states could commit to the principle that military material should be secured to the same or higher standards as comparable (or equivalent or similar) civilian materials.

Expand the Sharing of Best Practices to Military Material: Best practice sharing is not only applicable to materials in civilian programs but also to military material, particularly as nuclear-armed states have unique experience securing such materials and can learn from one another. Because of the challenges around the sharing of sensitive information, best practice sharing in the military sphere could be done in the context of small groups of nuclear-armed states or between states with relationships of trust. This could also include the sharing of best practices between civilian and military professionals. One specific example of information sharing is that the United States will host a P-3 (U.S.-UK-France) expert-level security information exchange in 2014 to discuss site vulnerabilities and good practices at a U.S. site with significant amounts of military material.

Minimization, Consolidation, and Elimination: One way to address security concerns of weapons-usable nuclear material is to reduce the number of sites where this material is located and to eliminate as much material as possible. In the United States, for example, Category I and II material were completely removed from Lawrence Livermore National Laboratory and Sandia National Laboratories in 2012. Consolidation of material to fewer sites can increase security confidence by reducing the number of vulnerable locations for potential theft.[5]

Openness/Confidence Building: Additional confidence-building steps could be taken to provide confidence to the public as well as the media regarding declared activities. For example, the

[5] Matthew Bunn and Eben Harrell, "Consolidation: Thwarting Nuclear Theft," Harvard Kennedy School's Belfer Center for Science and International Affairs, March 2012.

Pantex plant in Amarillo, Texas, the site where U.S. nuclear weapons are assembled and disassembled, used to conduct "Media Day" during which the public and press were invited to visit the Pantex facility and were provided presentations and access to certain parts of the facility. This was done without disclosing any sensitive information and could be a model for other facilities in the United States and abroad to build confidence.

1540 Reporting: In their reports to the 1540 committee, nuclear-armed states could report on the physical protection approaches employed for military materials (e.g., to what extent they are applying INFCIRC/225/Rev.5). To accomplish this, a set of reporting principles or guidelines that would build confidence that physical protection measures are being adequately implemented, while also protecting sensitive security information, needs to be developed. The United States did so in its most recent 1540 report, discussed in the Appendix.

Declarations: Another means of building confidence in the security of military materials could be to make declarations about materials quantities and storage location. Such declarations, depending on how detailed they are, could provide a level of confidence that military material is effectively accounted for and would help correlate available information to show that military material is covered by accountancy and related measures. For example, in June 2012, the United States published an unclassified report entitled "*The U.S. Plutonium Balance, 1944-2009.*"[6] This report listed the total quantity of plutonium in the custody of the U.S. Department of Energy and the U.S. Department of Defense (a total of 99.5 metric tons). It also provided information on specific quantities of plutonium at sites in the U.S. nuclear weapon complex. Other nuclear-armed states could make similar declarations, as appropriate to their national circumstances and security concerns. As noted earlier, it would be very beneficial if nuclear-armed states could agree to disclose additional data on each of the different categories of weapons-usable nuclear materials as part of a transparency or confidence building initiative.

Looking Forward

The 2016 Nuclear Security Summit provides an opportunity to work further to develop creative ways to build confidence in the security of 85% of global stocks of weapons-usable nuclear materials—military materials. Even if all civilian material was fully secured to the highest standards, this would only cover 15% of the weapons-usable nuclear material around the world. This paper highlights the need to focus on this important issue and documents past experience and new ideas for consideration to meet the intent of the 2014 Summit communiqué's pledge to secure all material, including those in nuclear weapons.

[6] http://fissilematerials.org/library/doe12.pdf

APPENDIX: U.S. National Statement and the Security of Military Materials

A starting point for discussions on actions that states could undertake to build confidence in the security of their military materials could include elements from the U.S. National Progress Report for the 2014 Nuclear Security Summit. In the U.S. National Statement, several specific examples of measures that increase confidence in the security of military materials were highlighted. These measures could be considered by other states as building blocks to increase confidence in their own military materials. The U.S. National Statement included the following:

- A statement that the United States secures all military material "in exemplary fashion," and takes IAEA INFCIRC/225/Rev. 5 into account in the security of its military material.
- Publication of regulations governing security of military material, and associated annual budgets.
- Maintaining human reliability programs for personnel responsible for securing military material.
- Publishing studies and reviews of nuclear security incidents, including lessons learned and actions taken (e.g., the Department of Energy Office of the Inspector General Report on the Y-12 incident).
- Reporting on security of military material through the United Nations Security Council Resolution 1540 (UNSCR 1540) reporting processes.

On October 11, 2013, the United States provided a comprehensive report to the UNSCR 1540 Committee. This report was a comprehensive update of U.S. laws, policies, projects, and initiatives to prevent illicit trafficking of weapons of mass destruction, their delivery systems, and related materials to non-state actors. The report noted that the United States has a host of measures in place, including several it recently updated, "to assure the security and physical protection of its nuclear weapons and materials."[7] These included updating Department of Defense Directives on the "Nuclear Weapons Surety Program" in April and August of 2013 and updating directives associated with "Security Policy for Protection of Nuclear Weapons."

[7] "Additional Information on Measures Taken to Implement United Nations Security Council Resolution 1540 by the United States of America" (October 11, 2013), at http://www.un.org/en/ga/search/view_doc.asp?symbol=S/AC.44/2013/17.