Disclaimer: This paper reflects early analysis and proposals from the Global Dialogue process. It does not reflect the consensus opinion of NTI or the group of global experts participating in the Global Dialogue. Since then, the thinking of the group on the concepts presented has evolved. To learn more about the Global Dialogue and for the most current papers, visit the project page.

GLOBAL DIALOGUE ON NUCLEAR SECURITY PRIORITIES

OPTIONS FOR STRENGTHENING THE GLOBAL NUCLEAR SECURITY SYSTEM[1]

October 2, 2012

CONSENSUS ON STRENGTHENING THE GLOBAL NUCLEAR SECURITY SYSTEM

At the first meeting of the Global Dialogue on Nuclear Security Priorities, the Nuclear Threat Initiative (NTI) proposed that the global nuclear security system required strengthening and identified five characteristics of what should comprise such a strengthened system.[2]

1. The system should be **comprehensive**; it should cover all nuclear materials and facilities in which they might be present, at all times.
2. The system should **employ best practices, consistently and globally.**
3. At a national level, each state's system should have **internal assurance and accountability mechanisms.**
4. Globally, the system should facilitate a state's ability to provide **international assurances** that all nuclear materials and facilities are secure.
5. The system should work to reduce risk through **minimizing** or where feasible, **eliminating weapons-usable material stocks** and the number of locations where they are found**.**

We believe a system that meets these characteristics can be achieved by strengthening existing mechanisms and through voluntary measures implemented by states in the near term. It does not require the negotiation of a new legal mechanism or convention at this time. While legally binding mechanisms may be desirable at some future point, the current lack of political consensus for such an agreement would delay urgently needed security upgrades that could be achieved sooner through voluntary mechanisms.

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[1] This paper is informed by and draws on ideas from papers commissioned by NTI from Roger Howsley, Patricia Lewis, Anita Nilsson, Pavel Podvig, and William Tobey. Those detailed discussion papers will be made available to Global Dialogue participants separately.

[2] See NTI white paper, "Strengthening the Global Nuclear Security System," July 10, 2012.

The discussion at the first Global Dialogue meeting demonstrated a strong consensus from participants on the need to strengthen the global nuclear security system, both for each state individually and for all states globally, and to address gaps in today's patchwork of agreements, guidelines, and multilateral engagement mechanisms. There was also convergence on the five characteristics and a wide-ranging discussion of the implications of each characteristic for existing expectations, behaviors, obligations, and mechanisms.[3] At our second meeting, we propose to advance the group's thinking on three of the key issues that emerged and for which no other forums currently exist. In particular, this paper addresses (1) the role of best practices and standards in strengthening security; (2) the global security benefits of international assurances; and (3) the feasibility of achieving a system that is comprehensive in its coverage of all weapons-usable nuclear materials, including materials outside civilian programs.

THE ROLE OF BEST PRACTICES AND STANDARDS IN STRENGTHENING SECURITY

At the first meeting of the Global Dialogue, there was much discussion about the difference between "best practices" and "standards" and how each approach contributes to improving nuclear security implementation on the ground. This section aims to lay the foundation for a common understanding of what we mean by "best practices" and "standards," the relationship between them, and the role they should play in a strengthened nuclear security system. To effectively manage the nuclear security mission globally, the international community must employ the tools best able to provide urgent, consistent, and effective security improvement.

Defining Standards and Best Practices[4]

The following definitions guide the discussion and are generally accepted "generic" descriptions for these two concepts, not specific to the nuclear field.

- A **standard** is established by authority, custom, or general consent and defines performance requirements, specifications, guidelines, or characteristics.
- A **best practice** is a method or technique that has consistently shown results superior to those achieved with other means and that, through experience and research, has proven to reliably lead to a desired result.

Therefore, standards define *objectives*, whereas best practices describe *the process* by which an actor can meet or exceed these objectives, other legal/regulatory requirements or performance goals. While standards represent a *consensus judgment* on security goals—and therefore reflect a minimum level of agreement—best practices are a means of implementing security to reach an *optimal* level of performance for a given set of conditions. The existence of a standard is not a prerequisite for the

[3] See the "Global Dialogue on Nuclear Security Priorities Rapporteur's Report," July 2012, for a report of the proceedings of the first meeting of the Global Dialogue.

[4] For more details on the characteristics of best practices and standards, see William Tobey's discussion paper for the Global Dialogue, "Defining and Implementing Best Practices in Nuclear Security."

development and implementation of best practices. Best practices not only help implement standards but also can inform their creation and show the way for better and more effective security approaches.

Standards are relatively static, usually evolve slowly over time, and often lag behind emerging threats or new technology. They have the benefit of being politically or institutionally authoritative and can successfully define the consensus of a diverse community around a shared objective. But standards can be slow to develop and consensus may be difficult or impossible to build in a timely fashion. It would take a lot of political will, time, and resources to define a sufficiently robust set of nuclear security standards which would significantly improve nuclear security globally, and it is clear that the consensus to tackle this challenge does not yet exist.

A *de facto* set of nuclear security standards already exists in the form of the International Atomic Energy Agency's (IAEA) INFCIRC/225/Rev. 5, in the annex to the Convention on the Physical Protection of Nuclear Material (CPPNM), and in the security fundamentals contained in the CPPNM's 2005 amendment. Given its near universality, INFCIRC/225/Rev. 5 is the primary nuclear security standards document. It is an IAEA document that provides guidelines and recommendations for security of nuclear materials and facilities. Since the first iteration of INFCIRC/225 in 1975, it has since undergone revisions in 1977, 1989, 1993, 1999, and most recently in 2011. While compliance with INFCIRC/225/Rev. 5 is voluntary, it has other characteristics of a standard, though it is relatively static and does not provide a flexible, dynamic description of how to implement the guidelines it contains. The IAEA also offers implementation guides to support the recommendations contained in INFCIRC/225/Rev. 5. These guides provide important assistance in interpreting the provisions of INFCIRC/225, but they are not necessarily reflective of specific experience and do not comprise best practices. The CPPNM and its amendment add to the body of minimum international nuclear material standards, though they are not universal and the amendment has yet to come into force.

Security implementation, however, can be rapidly and effectively improved through the development and sharing of nuclear security best practices which are dynamic and can be tailored to a specific set of circumstances and conditions. Unlike standards, which are agreed upon and adopted by an organization or body, best practices develop from the experience of many individuals and groups and are constantly evolving. Best practices are most effective when they are widely discussed and are informed by contributions from the broadest possible set of experiences.

Although the characteristics of best practices and standards may be different, they should be viewed as related concepts. Standards and best practices share the same goal—in the case of nuclear security, to ensure that nuclear materials are secure from unauthorized access and theft and that nuclear facilities are secure from sabotage.

While best practices aim to implement a standard in an optimal manner, only standards can place states under a legal obligation to provide minimum levels of security and reflect a political commitment to achieving security objectives. Standards and best practices play parallel,

complementary roles in ensuring security.

Why are Best Practices Important?

The international community has authoritatively established the value of best practices for rapid and effective security improvement. The 2012 Nuclear Security Summit communiqué "encourage[d] States to share best practices" and the Terms of Reference for the Global Initiative to Combat Nuclear Terrorism (GICNT) called for members to participate in "workshops to share best practices." Best practices provide a bridge between standards and the necessary level of security to address real threats. Best practices can run ahead of the international consensus discussion of minimum standards and create a path toward stronger standards in the future when political consensus is built.

Best practices also are important because they draw from the experience of a wide constellation of professionals, from both governments and industry, and from different countries. These professionals pool their best ideas and share lessons learned with one another. Over time, this improves the overall quality of security across the globe.

In the end, best practices are effective tools for ongoing security improvement only when they are both shared and implemented. This requires practitioners who participate in best practice exchanges to recognize the value of continuous improvement and commit to a process that will support it. As with standards, best practices are just words until they are put into practice.

Existing Mechanisms for Sharing Best Practices

The World Institute for Nuclear Security (WINS) is the only international organization solely devoted to the development, exchange, and promulgation of nuclear security best practices. To help fill a capacity gap in the nuclear security field and assist with nuclear security implementation, WINS was created to provide an international forum for developing and promulgating best practices to the boards, CEOs, security directors, security practitioners, and regulators who have responsibilities for developing, overseeing, and maintaining nuclear security.[5] WINS offers a series of best practice guides on topics ranging from nuclear security culture to threat assessment to effective security regulation and implementation; the organization also conducts workshops to gather and disseminate best practices. WINS has developed a peer review mechanism for security management that is offered on a voluntary basis and is creating accredited training programs for professionals at all levels of security management and operations. Through these activities, WINS creates a community of practice for ongoing engagement of nuclear security professionals.

Best practices are transmitted informally through other mechanisms as well, such as workshops or

[5] NTI was a partner in establishing WINS in 2008. WINS was loosely modeled on the World Association of Nuclear Operators (WANO), which was established after the Chernobyl accident to provide a forum for nuclear power plant operators to shared best practices and lessons learned about reactor safety. As a voluntary organization, WINS currently has over 1,100 individual and corporate members from 62 countries drawn from private industry, police, government agencies, state regulators, and national laboratories.

training programs where security professionals gather from around the world. These activities are regularly carried out by the IAEA, the GICNT, and the 1540 Committee among others and play a vital role. All fora that engage practitioners can be informal mechanisms for improving security practice.

Strengthening Best Practices

While the sharing of best practices—through WINS, other training programs, assistance programs, and peer review—has helped increase standards of security in many places, more work should be done to expand the sharing and implementation of best practices and to garner political and financial support for these activities.

WINS and the IAEA, in particular, play important complementary roles in supporting good nuclear security practices. Both are well placed to make the case for best practice sharing and to encourage more states to participate in exchanges and to follow through on implementation. For example, the IAEA Office of Nuclear Security addresses nuclear and radiological material in civil uses and WINS can engage with nuclear material managers without regard to their use. The IAEA speaks authoritatively and directly with governments, while WINS works with security practitioners within states, the nuclear industry and at facilities. The missions of both organizations can and should be strengthened since they address security in different but crucial ways. States and other stakeholders should empower WINS and the IAEA, by providing more human and financial resources for their activities. Effectively and sustainably expanding implementation of best practices will require resource commitments from states and the private sector.

There is also a lingering suspicion among some states and security professionals that best practices cannot be shared without compromising the confidentiality of sensitive information. WINS and the IAEA have demonstrated that this is not the case. Certainly a small subset of security information must remain secret—in particular regarding specific security arrangements at sites—the vast majority of security discussions can be shared among professionals. The nuclear safety field demonstrates that sharing best practices need not venture into sensitive areas to be useful. States also may consider designing future facilities to more easily allow for international cooperation and training, such as been done in various international centers of excellence and the Hazardous Materials Management and Emergency Response (HAMMER) training center at Pacific Northwest National Lab in the United States. Those responsible for security—the operators and licensees—can lead the way in establishing and sharing best practices to demonstrate the values of these engagements without creating undue security vulnerabilities.

To persuade more countries to participate in best practice sharing, states that have found such activities to be valuable could make statements to that effect at the 2014 Nuclear Security Summit and make commitments to engage in further sharing and implementation of best practices. States that have yet to take part in best practice sharing could be invited to join this commitment.

THE GLOBAL SECURITY BENEFITS OF INTERNATIONAL ASSURANCES

Defining International Assurances

At the first Global Dialogue meeting, the group had a robust discussion about the concept of "international assurance." In particular, we spent time discussing what was meant by the term and possible examples of assurance. The group converged around the following approximate definition:

> Activities undertaken, information shared, or measures implemented voluntarily by a state or other stakeholders to provide confidence to others (the public, another government, a designated organization, etc.) of the effectiveness of nuclear security within a given state.

The group felt that while some form of legally binding measures to provide assurances may ultimately be desirable, as a practical starting point, it would be helpful to define steps that could be undertaken voluntarily.

International assurance is not a new concept. "Assurance" mechanisms are widely used across many industries. The International Organization for Standardization (ISO), for example, has developed more than 19,000 standards for hundreds of fields such as nuclear safety, water quality, construction, and information technology.[6] Organizations that subscribe to ISO standards provide international assurance to each other by participating in what the ISO calls "conformity assessments." A conformity assessment is a process used to show that a product, service, or system meets specified requirements contained in an ISO standard. Conformity assessments occur through certification, inspection, and/or testing. Such assessments can assure the public or other stakeholders of the safety, reliability, or quality of a given system.

Other industries demonstrate that providing international assurances is not only possible but is commonplace.[7] While nuclear security provides its own set of challenges, these are not insurmountable and attempts to overcome them should be a priority to strengthen the global nuclear security system.

At the upcoming meeting, we plan to discuss how international assurances are important for strengthening nuclear security and explore specific ways in which states and other stakeholders can offer assurances without compromising sensitive information.

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[6] Organizations that compete with one another commercially, yet have shared equities in maintaining public safety and confidence, subject themselves to international standards because they bring economic, technological and societal benefits such as cost savings, improved quality of products and services, access to markets, increased market share, and environmental benefits.

[7] For a detailed discussion of examples of international assurances from other industries, see Patricia Lewis's discussion paper for the Global Dialogue, "International Assurances for Nuclear Security."

How Are International Assurances Important?

A strengthened global nuclear security system should facilitate a state's ability to provide international assurances that all nuclear materials and facilities are secure. Such assurances are about building confidence in the effectiveness of the global nuclear security system rather than making a guarantee about specific behaviors. Yes, nuclear security is a sovereign responsibility, but because the economic and security consequences of a nuclear catastrophe would reverberate around the globe and shake public confidence in both nuclear industry and governments, other governments and the global public have an equity in having some insight into how well the global nuclear security system is functioning. International assurances can play a vital role in building confidence among publics, raising the level of practice among governments and industry leaders responsible for nuclear security, and ultimately, yielding important global security benefits.

Options for Providing International Assurances in the Nuclear Security Field

The following is an initial list of actionable and practical steps for consideration and discussion. As illustrated by the ideas listed below, the foundation for international assurances in the field of nuclear security already exists. This list is not meant to be exhaustive, and we hope the upcoming discussions will generate other practical suggestions for steps that can and should be taken to ensure public confidence in global nuclear security.

Information Sharing: Many governments already engage in some form of international assurance by publishing either annual reports of nuclear security issues or the broad outlines of their nuclear security regulations. According to the NTI Nuclear Materials Security Index, as of 2011, 13 countries published both nuclear security regulations and an annual report on nuclear security issues, and 17 other countries published either regulations or an annual report. Public release of these documents increases confidence that the basic legal and regulatory framework required for nuclear security may be in place within the state.

Expanding IPPAS and Other Peer Review Mechanisms: The IAEA offers peer reviews through its IPPAS missions. The purpose of an IPPAS mission is to provide recommendations to requesting states on ways to strengthen their nuclear security systems (including legal and regulatory systems) and assess whether these systems comply with treaties and IAEA guidelines. However, since the first IPPAS mission in 1996, only 55 IPPAS missions have been performed in 37 countries.[8] By hosting an IPPAS mission, a state demonstrates a commitment to strengthening its nuclear security through external review, which in turn builds international confidence in its nuclear security system. Although this is an important opportunity for improving security, there is no obligation of the state to follow the recommendations made by the review team, address deficiencies, or otherwise be made accountable to the public of the IAEA for the findings. Further expanding the capacity for peer review

[8] For more information about IPASS missions and options for improving them, see Anita Nilsson's discussion paper for the Global Dialogue, "IPPAS Missions: Building Transparency and Confidence."

in the nuclear security field, WINS is exploring providing peer review of security management and implementation of security responsibilities by practitioners.[9]

Globalizing the Sharing of Best Practices: As discussed in the section on best practices, the international exchange of best practices is necessary to improve security and to assist in implementing nuclear security standards and guidelines. Sharing and promoting best practices at the international level also provides a measure of international assurance that nuclear security practitioners are able to learn from the experiences of others in a field where a practitioner isolated from those experiences could spell disaster.

Physical Protection Assessments: One existing, but potentially underused, international assurance mechanism is based on the physical protection requirements attached to nuclear cooperation agreements or as part of export agreements instituted by several countries such as the United States, Canada, Australia, and for EURATOM countries when engaging in nuclear commerce. For instance, the United States has 27 nuclear cooperation agreements which require partner countries to guarantee the physical protection of U.S.-origin nuclear material. The U.S Department of Energy, the Nuclear Regulatory Commission, and the U.S. Department of State visit partner countries to ensure adequate physical protection is in place for these materials. These visits are conducted in cooperation with the partner country on a voluntary basis (i.e., explicit rights of access may not be written into the agreements although the requirement to physically protect material to certain standards is). These visits are based on an inter-agency process which prioritizes visits based on categories of materials, quantity of material, whether a country is making recommended improvements, information from previous physical protection assessments, and other concerns. As such, these assessments hold the partner state accountable to their nuclear security responsibilities and enable the United States to provide assistance when needed. These bilateral exchanges provide a measure of international confidence.

Certification: A measure of assurance could be provided if an accredited certification could be established for those individuals responsible for nuclear security. Simply by training and certifying all security personnel to an agreed baseline could build confidence in a state's ability to provide efficient and effective security. Certification is a method of providing assurances in other industries, including nuclear safety, as discussed below. The ISO also recommends certification as means for performing "conformity assessments," as discussed above. WINS would be a good candidate for a body that could develop a certification program, since it already conducts training and plans to soon launch the WINS Academy for Professional Development. Providing uniform training and certification will help ensure that states are implementing an appropriate standard of security practice across the globe.

[9] For a more detailed discussion on peer review and options for strengthening it, see Roger Howsley's discussion paper for the Global Dialogue, "International Nuclear Security Peer Review – An Essential Contribution to Effective Governance."

Trusted Agent: Granting access to sites containing nuclear materials, particularly to nationals from other states, can be problematic, especially for weapons materials. This problem was largely solved in the Russian-U.S. lab-to-lab Material Protection, Control and Accounting (MPC&A) collaboration involving U.S. and Russian scientists because they held a high mutual regard for each other and developed a relationship of trust through joint efforts to rapidly upgrade security of weapons and weapons materials following the end of the Cold War. Because both states involved in the arrangement had nuclear weapons, proliferation of nuclear weapons know-how was less of a concern than protection of proprietary and country-specific sensitive information.

But in the MPC&A program, not all sites were opened to counterparts from the other country. This led to consideration of the use of "trusted agents" who would be nationals of the host state and who—by force of scientific reputation, standing, and training in security matters—could be relied on to self-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 materials in nuclear-armed states are under adequate control. A variation on this concept might also prove beneficial, whereby nuclear-armed states could certify security effectiveness through an accredited certification process and convey that assurance to non-nuclear weapon states, reducing concerns about the spread of nuclear weapons information.

Bilateral Cooperative Programs: States can work with bilateral partners to cooperate in providing assurances to one another about each other's security. The Cooperative Threat Reduction (CTR) and other U.S.-Russian cooperation programs like the MPC&A program and the U.S.-Russian Plutonium Management and Disposition Agreement (PMDA) demonstrate "proof of concept" that meaningful work can be done to secure and dispose of material without compromising a country's most sensitive security information.

COMPREHENSIVENESS: MATERIALS OUTSIDE OF CIVILIAN PROGRAMS

At our last meeting, we discussed the importance of strengthening security around all weapons-usable nuclear material; in other words, the security system should be comprehensive. We defined this goal as an important characteristic of an effective global security system. Yet today, the vast majority of weapons-usable material is not subject to international standards, guidelines, best practices, or mechanisms for international assurance. We also had a rich discussion about whether, and if so how, material outside of civilian programs should be brought under the umbrella of such efforts. Could states devise ways to assure each other that their non-civilian materials are secured consistent with international guidelines and best practices? How can sensitive security information be protected under this scenario? Are there any instructive examples of information sharing or cooperative work among states on non-civilian materials? This section intends to provide some clarity about what is meant by materials outside of civilian programs and to allow the group to challenge some of its assumptions about the level of security applied to these materials and whether confidence-building measures 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.[10] Virtually all HEU and approximately half of the plutonium that have been produced remain outside civilian programs. If the purpose of the nuclear materials security system is to ensure that 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 somehow ensuring that these large quantities of materials are under effective security. Even a small fraction of one percent of these materials—enough plutonium to fill a soda can or enough HEU to fill a soccer ball—would be sufficient to fabricate a crude nuclear device that if used would have catastrophic consequences that would ripple around the globe.

It is generally assumed that material outside civilian programs is under military protection and therefore, is better protected than material in civilian programs. The unauthorized transfer of six nuclear weapons across the United States in 2007 challenges this assumption and demonstrates why all states need to remain ever vigilant and can always do more to improve nuclear security.

Moreover, not all materials outside civilian programs are protected by the military. Using the United States as an example, material contained in active warheads and in use or in reserve for naval propulsion is protected by the military. Materials in the form of warhead components, warheads undergoing maintenance, warheads in dismantlement queues, and the vast stockpile of U.S. legacy materials are actually in the custody of the U.S. Department of Energy, where it is protected by civilian security contractors. For example, the recent security breach at the HEU storage facility at the Y-12 National Security Complex in the United States was targeting material removed from military use and in storage at a government—but not military—site under this kind of arrangement.[11] More material is also in use in the United States at non-civil facilities such as research reactors and for other science and technology missions. This should challenge the assumption that material outside civilian programs is all in nuclear weapons and subject to a more stringent level of protection.

As discussed below in detail, the universe of material outside of civilian programs is diverse and comprises material in different forms, in different facilities, and in different uses. Some of the material, while outside civilian programs, is not used in nuclear weapons or nuclear weapons components. Is it possible as a starting point to voluntarily bring some of this material under existing international standards and best practices and treat it in the same way as we do materials and facilities in civilian programs? While developing a completely comprehensive system might not be

[10] *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.

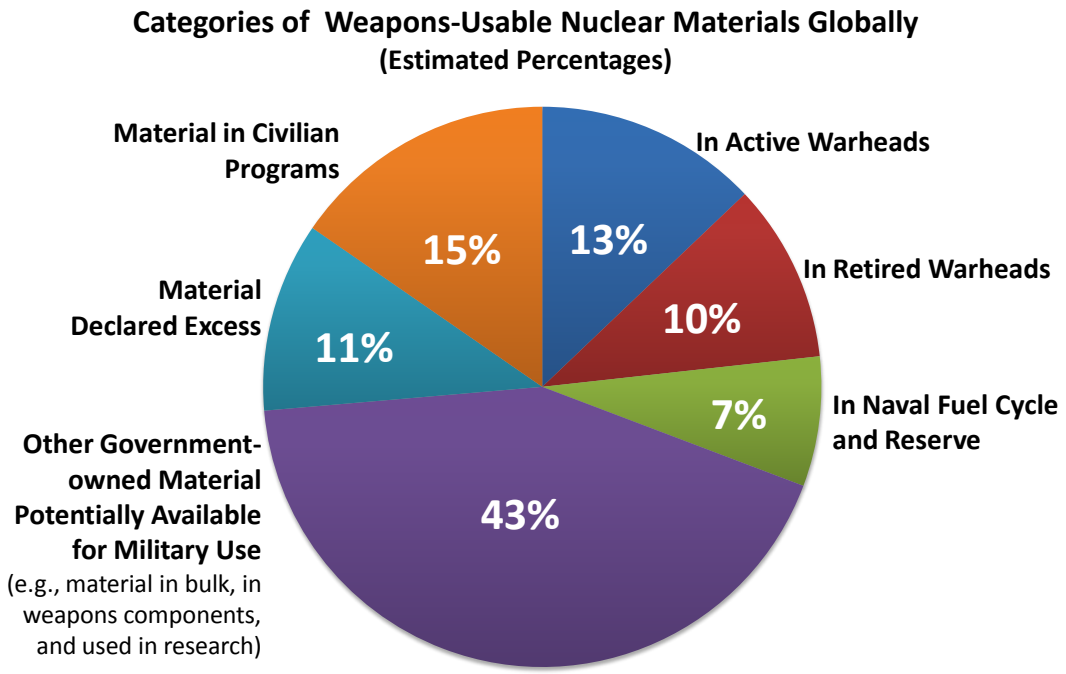
[11] On July 28, 2012, three activists, including an 82-year-old nun, were able to enter a heavily guarded section of the Y-12 National Security Complex in Oak Ridge, Tennessee. The activists had time to pour blood, raise placards, and paint on the structure before being confronted. The Y-12 facility houses several hundred tons of weapons-grade HEU and was previously thought capable of defending against armed terrorists.

practicable in the near-term, shouldn't our goal be, at a minimum, to increase the percentage of material that is subject to standards, guidelines, best practices, and mechanisms for international assurance as much as possible?

Types of Materials Outside of Civilian Programs

Fifteen percent of total quantities of weapons-usable nuclear materials are used in civilian programs based on public estimates. There is a common misunderstanding that all material outside of civilian programs is used for nuclear weapons programs (either in assembled nuclear weapons or weapons components). Yet, as a category, materials outside of civilian programs, is quite diverse. 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; the remaining 43% includes other government-owned material potentially available for military use (e.g., material in bulk, in weapons components, and used in research). This last category is ill-defined because of the lack of publicly available data in some areas.

Figure 1 below shows categories of weapons-usable nuclear material globally by estimated percentages.[12]



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.

[12] For a detailed discussion of the types of materials in nuclear-weapon states, see Pavel Podvig's discussion paper for the Global Dialogue, "Nuclear Security and Materials Outside of Civilian Programs."

Options for Building Confidence in the Security of Materials Outside of Civilian Programs[13]

Traditionally, information related to materials used for military purposes has been treated as sensitive, classified information. The nuclear industry was born out of a highly classified nuclear weapons program, and secrecy was deemed necessary to prevent proliferation. For this reason, states have been reluctant to share any information with respect to this material. Today, in a globalized world with many countries in possession of weapons-usable nuclear materials, managing proliferation and nuclear security presents an opportunity to revisit where the international community draws the lines around these sensitivities. Cooperative programs between countries in the past several decades—particularly between the United States and Russia, such as the Cooperative Threat Reduction (CTR) program and Material Protection, Control, and Accounting (MPC&A) programs, as well as efforts by some nuclear-weapon states to increase transparency—demonstrate that there are ways to build confidence in the security of these materials without compromising sensitive information. (Please see the related discussion in the international assurance section of this paper.)

Moreover, as discussed above, there are types of material outside of civilian programs not used in nuclear-weapon programs. A first step to increasing the amount of material subject to some kind of standards, guidelines, best practices, and/or assurances could begin with these materials, and confidence-building measures could more easily be applied to these materials without the need to share sensitive information. Some examples of steps that states with these materials could take include:

1540 Reporting: In their reports to the 1540 committee, states could report on the physical protection approaches employed for materials outside civilian programs. To accomplish this, a reporting standard that would provide assurance that physical protection measures are being adequately implemented, while also protecting sensitive security information, needs to be developed. This would require the cooperation of nuclear-armed states.

Certification: As discussed in the section on international assurances, the development of a certification program to assure 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 non-civilian materials. States could require such certification of the contractors employed to protect government sites.

Trusted Agent: The concept of a trusted agent, discussed above in the section on international assurances, could be also applied to materials outside of civilian programs.

Bilateral Arrangements: As discussed above, CTR and other U.S.-Russian cooperation programs, like the Material Protection, Control, and Accounting program and the U.S.-Russian Plutonium

[13] For a more detailed description of these options, see Pavel Podvig's discussion paper for the Global Dialogue, "Nuclear Security and Materials Outside of Civilian Programs."

Management and Disposition Agreement (PMDA), demonstrate the value of bilateral mechanisms to improve security and build confidence. They also demonstrate that this is possible without compromising sensitive information. The United States and Russia are in a unique position to encourage other countries to take part in similar arrangements and share their experience cooperating together, including ways to avoid sharing sensitive information.

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 recently completely removed from Lawrence Livermore National Laboratory and Sandia National Laboratory. Consolidation of material to fewer sites can increase security confidence by reducing the number of vulnerable locations for potential theft.[14]

The U.S.-Russian PMDA is an example of a security cooperation and materials elimination program. Under the agreement, 34 metric tons of weapons-grade plutonium is slated for elimination on each side by using it to fabricate mixed-oxide (MOX) fuel that will be irradiated in power reactors. The IAEA will provide independent verification of disposition of U.S. and Russian excess plutonium, subject to the PMDA's provisions. Material will become subject to IAEA verification once the material as plutonium oxide enters the fuel fabrication process.

It is notable that under this agreement, material from classified warheads will be repurposed for use in civilian reactors. This is instructive in that it demonstrates the ability to move materials from the military side of the ledger to the civilian side of the ledger—perhaps the same principle can be applied to how we think about bringing more materials under the umbrella of international standards, guidelines, best practices, or mechanisms for international assurance.

As a first step, the United States and Russia could use the PMDA as an opportunity to expand their cooperation on nuclear security by exploring whether physical security best practices or assurance arrangements could be applied to the plutonium in the disposition program until it is eliminated. Other material declared in excess of defense needs may be converted from sensitive forms and be made available for international cooperative efforts or become part of other assurance mechanisms on a voluntary basis.

Declarations*:* One means of building confidence in the security of nuclear materials outside civilian programs could be to make declarations about materials quantities. Such declarations could provide a level of confidence that material is accounted for and could also encourage the sharing of best practices for accounting. The United States and the United Kingdom have made declarations of materials production history and warhead numbers in the past without compromising sensitive information.

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

ISSUES FOR DISCUSSION

This paper has outlined issues for further consideration for the community of officials, experts, and practitioners seeking to strengthen the global nuclear security system. During our second meeting of the Global Dialogue on Nuclear Security Priorities in the Netherlands, we will discuss the ideas raised in this paper. In particular, please come prepared to discuss:

- How can best practice mechanisms be expanded to improve the global level of practice?
- How can governments and/or other stakeholders provide international assurances about nuclear security?
- Are there voluntary measures nuclear-armed states with materials outside of civilian programs can take to build confidence in the security of these materials without undermining national security?
- What concrete proposals for action (individually, in groups, and across sectors) can animate the characteristics of a strengthened nuclear security system?

We look forward to your active participation, and thank you for joining us for this important discussion.