

STRENGTHENING THE GLOBAL NUCLEAR SECURITY SYSTEM AND THE ROLE OF INTERNATIONAL ASSURANCES

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The Need for a Strengthened Global Nuclear Security System

The international nuclear security system today is a patchwork of agreements, guidelines, and multilateral engagement mechanisms. All of these, however, have numerous gaps and limitations. The challenge then is to strengthen the system, both for each state individually and for all states globally.

The primary responsibility for nuclear security begins with each state. While this is certainly the case for states which possess relevant nuclear materials and facilities, all states—even those without nuclear materials—must be alert to the possibility that their territories could be used as a safe haven, staging ground, or transit point for terrorist operations involving stolen nuclear materials.

The national responsibility to effectively meet nuclear security objectives, however, cannot be viewed as the exclusive domain of each state. In a world where global nuclear security is only as strong as the weakest link in the chain, every state has a security interest in how well others meet this responsibility. Sovereignty need not mean operating in isolation, particularly when the nuclear security system should be viewed as a global responsibility because risks related to nuclear security have a global impact. Many terrorist groups are transnational in their membership, objectives, and activities. Terrorists are opportunistic. They are likely to attempt to seize nuclear material where security is believed to be lax, and if they succeed in making a nuclear device, they may decide to use it where access to an attractive target is easiest. Thus, a failure of nuclear security in one state could well result in an attack in another. Likewise, as in Fukushima, a major radiation release in one state has serious political, economic, and environmental consequences in many other states and can erode the public confidence needed to sustain long-term public support for civilian nuclear technology, in all of its forms.

This paper identifies key elements of the existing nuclear security system, proposes characteristics of a strengthened global nuclear security system such as the development of international assurances, and reveals gaps in the existing system.

Objective of Nuclear Security

For framing a discussion about strengthening the global nuclear security system, we propose an overarching objective of nuclear security:

To ensure that nuclear materials are secure from unauthorized access and theft and that nuclear facilities are secure from sabotage.

A nuclear security system is effective if it meets this objective.

The Existing System

The current nuclear security system is defined by a number of international conventions and agreements, Security Council resolutions, International Atomic Energy Agency (IAEA) recommendations and guidance documents, and the security practices of states. Key defining or guiding documents and agreements include:

- The 1980 Convention on the Physical Protection of Nuclear Material (CPPNM) applies, primarily, to protection of nuclear material in international transport.
- The 2005 Amendment to the CPPNM extends the CPPNM's application to protection of nuclear material in domestic use, as well as protection of nuclear facilities against sabotage. The 2005 Amendment is not yet in force.
- The Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT).
- United Nations Security Council Resolution 1540.
- Various IAEA guidance documents, such as:
 - Fundamental Principles of Physical Protection of Nuclear Material and Nuclear Facilities
 - INFCIRC/225, Rev. 5, the current version of the IAEA's nuclear security recommendations
 - INFCIRC/153 and 66 (Safeguards Agreements) and their related requirements for the establishment of a State System for Accounting for and Control of Nuclear Material (SSAC).
- Various multilateral, regional, and bilateral agreements and initiatives that address nuclear security.

The foundational agreements, guidelines, and initiatives, even when combined, do not yet add up to a system that ensures that all nuclear weapons, weapons-usable nuclear material, and major nuclear facilities worldwide are effectively protected against today's terrorist and

criminal threats—let alone those that may arise in the future. Furthermore, the majority of these arrangements are non-binding and both participation and implementation varies widely.

Key Elements of the Existing System

Three overarching elements required for each state's system emerge from the various guidance documents referenced above:

A Rigorous Material Accounting and Inventory Control System: *States should have in place an effective system for identifying, characterizing, quantifying, monitoring, and tracking all nuclear materials under their control.*

Access to nuclear material cannot be successfully limited to authorized persons for authorized purposes if those responsible for nuclear material do not know precisely what their nuclear material inventories are and where they are located, at any given time.

Requirements for the nuclear accounting and control system are set out by the IAEA in its safeguards agreements with states. These agreements require each state to establish a State System for Accounting for and Control of Nuclear Material (SSAC) and detail the requirements of such a system. Today, every state with nuclear material has a safeguards agreement with the IAEA (with the possible exception of North Korea)—though the requirements under these agreements (and their SSACs) depend on whether the state is a non-nuclear-weapon state, a nuclear-weapon state, or a non-NPT state. A large fraction of the world's weapons-usable nuclear material is in states with nuclear weapons, however, only a small percentage of the world's highly enriched uranium (HEU) and less than half of the world's separated plutonium is subject to any kind of international discipline in the quality of nuclear material accountancy. For states with comprehensive safeguards agreements (i.e., non-nuclear-weapon states party to the NPT), the SSAC applies to all of their nuclear material.

The most important measures for preventing theft of nuclear materials, however, are somewhat different from the measures required by the SSAC for confirming that the state has not diverted material from peaceful use. For example, keeping material in vaults when not in use and ensuring that no one has unmonitored access to nuclear material are quite important for preventing theft but are not usually central elements of an SSAC. To limit opportunities for theft, states must limit access to material only to authorized personnel (and to the minimum number of people required for ongoing operations); keep materials in secure vaults when not in use; and ensure that all storage and access of materials is monitored. The IAEA is developing a guidance document on materials control and accounting measures to prevent nuclear theft.

On-Site Physical Protection: *States should have strong physical protection measures in place at every site containing nuclear materials.*

The IAEA's nuclear security recommendations serve as international guides for developing physical protection systems, and other measures for protecting against outside and insider threats, including cyber security. The most current version of these recommendations can be found in IAEA document INFCIRC/225, Rev. 5, published in January 2011. In addition to the IAEA's recommendations, the IAEA's Fundamental Principles contain a number of general principles directly relevant to on-site security. Furthermore, the IAEA's Nuclear Security Series also provides documents on particular elements of national systems of nuclear security.

The IAEA's nuclear security recommendations were developed by an international experts group. They represent the consensus of states on what should be done to achieve adequate protection of materials. They do not, however, provide clear performance objectives or any performance criteria for ensuring that all states consistently meet a minimum standard or best practice.

To fill that gap, the World Institute for Nuclear Security (WINS) was established to develop and promulgate best practices for nuclear materials security. The WINS mission is to provide an international forum for those accountable for nuclear security to share and promote the implementation of best security practices. WINS' 1,000+ members include nuclear operators, trade organizations, regulators, and government policymakers drawn from 62 states.

Accountability Mechanisms: *States should have accountability mechanisms in place to assure themselves that their nuclear security systems are effective.*

States should have a sound basis for confidence in the effectiveness of their security measures and in holding accountable all persons and entities responsible for managing nuclear materials and facilities. This involves ensuring that the right institutional and supporting practices are in place. The IAEA Fundamental Principles outline general requirements for institutional elements, which include:

- An appropriate legislative and regulatory framework
- An independent and competent oversight authority
- A clear assignment of responsibilities for nuclear security with accountability for how these responsibilities are implemented.

The IAEA's physical protection recommendations also make clear that physical protection systems should be subject to inspection and to realistic testing of their ability to protect against intelligent adversaries trying to find ways to overcome them. Confidence in the system also requires other supporting processes such as publication of regulations, inspections and performance testing, and follow-up to problems identified, etc. Clear lines of responsibility and accountability for the nuclear system are important, both within the government and within operating organizations. These and similar processes provide knowledge of how a state's system works, which is necessary to evaluate whether it is working as intended. However, not all states follow such practices today.

Proposed Characteristics of an Effective System

Proposed below are five characteristics of an effective nuclear security system.

1. *The system should be **comprehensive**; it should cover all nuclear materials and facilities in which they might be present, at all times.*

The system should cover all nuclear materials and facilities, especially weapons-usable nuclear materials and facilities where sabotage could cause a major radiation release. Currently, not all weapons-usable nuclear materials have security in place that is capable of protecting against today's terrorists and criminal threats. Most operators handling these items are not participating in exchange of best practices and have never had an international peer review of their security practices. Current international guidelines do not apply to materials in military programs. States should consider how to bring these materials under international guidelines or best practices.

2. *The system should **employ best practices, consistently and globally**.*

In keeping with different threats and assessments of risks globally, states should take varying security measures and employ dynamic strategies. There is currently no system-wide mechanism for the regular exchange or development of best practices or for states to have a benchmark against which to judge them. WINS attempts to fill this vacuum by publishing and continuously updating best practice guides and by providing an international forum to share and promote best practices, but all relevant states do not currently participate, and there is no mechanism for confirming whether best practices are being implemented.

3. *At a national level, each state's system should have **internal assurance and accountability mechanisms**.*

These mechanisms should provide confidence to national authorities and the public that the system is operating as specified and that all persons and entities involved are held accountable for how they implement security responsibilities. Existing agreements and guidance urge states to provide internal assurance and accountability mechanisms through their legal and regulatory structures. However, not all states currently meet these guidelines. Internal assurances and accountability mechanisms are crucially linked to the concept of international assurances. A state cannot assure others without being assured itself.

4. *Globally, the system should facilitate a state's ability to provide **international assurances** that all nuclear materials and facilities are secure.*

Truly strengthening the global nuclear security system will require states to acknowledge that internal assurance and accountability mechanisms are important, but insufficient for enhancing global security. Instead, as those in other fields such as nuclear safety, finance and aviation have come to realize, all stakeholders benefit if there is confidence in how each individual stakeholder manages its special responsibilities. Although nuclear security is a distinct discipline, security itself is not. Providing confidence without undermining national security considerations may require careful navigation, but it can and must be managed.

Few mechanisms exist for a state to assure others that its nuclear security system is effective in meeting nuclear security objectives. International assurances are important for enabling all governments and publics in all states to be confident. In this respect, nuclear security is a long way behind nuclear safety. For example, the Nuclear Safety Convention requires each party to submit a national report that is reviewed by regular conferences of parties. The members of the World Association of Nuclear Operators (WANO)—composed of every nuclear power generating entity in the world—require regular, mandatory peer reviews of nuclear safety practices at power reactors.

Fortunately, some of the mechanisms that can provide confidence to national authorities that their nuclear security measures are being effectively implemented (i.e., internal assurances) could also be used for providing international assurances. If states are able to demonstrate that they have effective internal assurance and accountability mechanisms, such demonstrations provide valuable evidence about the credibility of a state's nuclear security efforts. A state could describe the internal assurance programs and processes it has in place which would provide international assurances and build confidence.

There is no binding commitment among states for external review and other forms of international engagement. That said, there are voluntary peer review processes available through the IAEA's International Physical Protection Advisory Service (IPPAS). WINS also offers

training on best practices and is in the process of establishing peer review mechanisms for corporate entities. As a first step, some initial international confidence could be generated if all relevant states with weapons-usable nuclear materials engaged in some kind of review process. The voluntary processes offered by the IAEA and WINS, however, are taken up only by the willing and not necessarily by those in greatest need of assistance and support. As a near-term measure, countries participating in the 2014 Nuclear Security Summit could commit to inviting an IPPAS or WINS review by 2016 (while recognizing that more resources would need to be devoted to the IAEA and WINS to conduct a large number of reviews).

The process required for such reviews underscores the value of increased interactions among practitioners, operators, experts and policymakers. This kind of interaction, or networking, where each constituency has an opportunity to better understand each other and the drivers of how decisions are made and priorities are created is one mechanism that could facilitate providing international assurances. States could commit to continue such interactions through WINS, Nuclear Security Support Centers, and Centers of Excellence. Regularizing this dialogue would enable security professionals to speak to one another and provide an understanding of states' best practices through training missions.

Another way by which to develop international assurances is to create an international security training and certification program to create a cadre of people to review the state's program internally (i.e., to provide trusted agent review within the state). WINS is developing an accredited nuclear security curriculum tailored to different roles within nuclear enterprises – from Boards of Directors to security officers. Those who go through the WINS Academy may be able to also serve as a resource to relevant national or international bodies. The ongoing bilateral or multilateral exchange of best practices (either within the CPPNM, WINS, IAEA, USNCR 1540, or some other forum) is another form of international assurance. States could also use and publish, in whole or in part, a self-assessment mechanism created by the IAEA.

One area for further consideration is how states, individually if not cooperatively, can provide international assurances about the security of materials outside civilian programs. Some states publish annual reports and/or the broad outline of regulations applied to civilian materials; could the same be done for materials outside of civilian programs? Finally, another area for further thought is whether incentives could be created for states to provide international assurances.

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.*

Today, there is no international obligation to minimize or eliminate holdings of weapons-usable materials, and there is no ready way to track what states are doing in this regard as few states disclose their holdings of these materials. A major international program is working to phase out the civilian use of HEU and eliminate HEU holdings has been successful, but 29 countries still have holdings of either HEU or plutonium.

This paper has outlined key elements of the existing system, proposed characteristics of a global nuclear security system, and identified gaps to be addressed to ensure that the global nuclear security system becomes more effective, robust, and sustainable over time in meeting nuclear security objectives. Our hope is that there can be a convergence of views from the community of experts, government officials, and nuclear industry representatives on what characteristics should make up an effective global nuclear security system. And because the two issues are inextricably linked, we hope to spark discussion about how to further develop internal assurances and accountability mechanisms as well as means by which states can offer international assurances.