Office of Nonproliferation and International Security (NIS)

National Nuclear Security Administration

SAFEGUARD AND SECURE | CONTROL | VERIFY | POLICY

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Highlights

Rescuing a National Security Asset

BY TAISSA SOBOLEV

Downblending a material that could be used to build a nuclear weapon sounds like something the United States would be in favor of. Uranium-233 (U-233) is a fissile material that, in sufficient quantities, could be used to produce nuclear weapons. However, NIS' Next Generation Safeguards Initiative (NGSI) is partnering with Oak Ridge National Laboratory to preserve high-purity U-233 due to its role in assuring our national security.

U-233 is a critical material to the fields of nuclear safeguards—where it helps provide assurance that countries are not developing nuclear weapons under the guise of peaceful nuclear energy—and nuclear forensics—where it helps detect and deter the use of nuclear explosives by terrorist entities. Many U.S. Government agencies have a need for high-purity U-233 for such activities as:

- developing new strategies and techniques for detecting clandestine and undeclared uranium activities,

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NIS Provides Ongoing Technical Capabilities that Support Summit Goals

President Barack Obama and President Lee Myung-bak of the Republic of Korea shake hands during their press conference before the Nuclear Security Summit. (Official White House Photo by Chuck Kennedy)

Evidence of the crucial work conducted by NIS can be seen throughout the 2012 Nuclear Security Summit Communiqué, which was issued at the close of the Summit in March. "Across the board, NIS is contributing to the goals of the Summit," says Melissa Krupa, the Deputy Director of the NIS Office of Nuclear Safeguards and Security. The 2012 Nuclear Security Summit was held in Seoul, Korea, and represents the latest installment in international

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From the Editor: The staff at NNSA's Office of Nonproliferation and International Security do a lot of behind-the-scenes work to support highly visible activities that benefit our nation and the international community. For the first time in this issue of *Highlights*, the articles offer a glimpse at some of these people by including their bylines, author notes, and direct quotes. Read in their own words about the work they do and expertise they provide to help NIS make a difference in securing, safeguarding, and controlling nuclear materials.

The Office of Nonproliferation and International Security applies program, technology and policy expertise to:

- **Safeguard and Secure** nuclear material to prevent its diversion, theft and sabotage.
- **Control** the spread of WMD-related material, equipment, technology and expertise.
- Negotiate, monitor and **verify** compliance with international nonproliferation and arms control treaties and agreements.
- Develop and implement DOE/NNSA nonproliferation and arms control **policy** to reduce the risk of weapons of mass destruction.

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- analyzing and confirming contents of forensics uranium samples, and
- calibrating mass spectrometers and gamma spectrometers for the accurate determination of uranium isotopic composition of unknown samples.

Based on this finding, NGSI launched a multi-year effort to preserve approximately 1 kg of high-purity U-233 from the stockpile to be down-blended. The preserved material should be sufficient to produce a supply of CRM that would satisfy U.S. *and* international CRM needs for more than 50 years. The additional material would be set aside to establish a strategic reserve of material for future CRM production. While NGSI initiated the U-233 preservation project, several other DOE programs as well as other government agencies have come forward to support this activity.

Glove boxes being prepared for the processing and qualification of the recovered U-233 items.

U-233, unlike the better known isotopes uranium-238 and uranium-235, is not found in nature. Instead, it is produced by irradiation of thorium in nuclear reactors. To obtain U-233 at purities useful for nuclear-security-relevant analyses (99.9+% pure), this material must be purified via chemical separation or electromagnetic isotope separation. A stockpile of this valuable isotope was produced in the 1960's, but the DOE Complex has since dismantled the facilities required for its production. Due to prohibitively high costs, it is very unlikely this capability will ever be restored.

The U-233 preservation effort began with a comprehensive survey of U.S. Government users, which determined that the current supply of U-233 certified reference material (CRM) would be exhausted in less than 20 years.

Taissa Sobolev serves as a program analyst for the NIS Office of Nuclear Safeguards and Security. Sobolev has been with NIS since 2010, where she started as a Nonproliferation Graduate Fellow.

cooperation to work toward strengthening nuclear security globally. But for NIS, these activities are not necessarily new. "It is part of our ongoing, statutorily mandated mission," Krupa explains.

The United States hosted the first Nuclear Security Summit in Washington, DC in 2010. During the Summit, the participating governments developed a set of commitments to strengthen their collective protection over nuclear material and support the international instruments and institutions that have responsibility for nuclear security, such as the International Atomic Energy Agency (IAEA).

The 2012 Summit provided an opportunity to both check in and build on progress made since 2010. The Seoul Summit Communiqué renewed the political commitments of the 2010 Summit and highlighted specific areas for achieving further progress.

INCREASING PHYSICAL PROTECTION

Krupa recognized that as part of its mission activities, "NIS played a significant role in completing many of the deliverables outlined in the Washington Summit that were reviewed in Seoul and we will continue our work in those areas before the 2014 Summit in the Netherlands." A case in point is the work NIS will continue to perform with respect to the fifth revision to IAEA document, *Physical Protection of Nuclear Materials and Nuclear Facilities*, also known as INFCIRC/225.

The revised document, which was developed as a result of NIS leadership, significantly strengthens international guidance for physical protection of nuclear material and nuclear facilities. NIS had been promoting the changes to these critical international recommendations under Krupa's leadership before the Washington Summit occurred. The process started by gaining consensus within NNSA and accessing the technical expertise from the National Laboratories. From there, NIS involved the U.S. Interagency and then promoted the document with a "Core Group" of five IAEA Member States. Eventually, the document went to all IAEA Member States for negotiation.

Although revision of these crucial nuclear security recommendations already was under way in 2010, "Gaining the support of world leaders at the Washington Summit really helped propel this document over the finish line," Krupa says. The document was published by the IAEA in January 2011 and NNSA has now embarked on a global mission with international partners to implement the new standards. "This initiative includes developing implementing guides and tools, conducting outreach to IAEA Member States, and providing training and other assistance." Among other noteworthy updates, Revision 5 strengthened guidelines for the protection of nuclear materials during use, storage, and transport and included new sections on the rapid recovery of missing nuclear material and protection against sabotage, all areas consistent with concerns raised at the Washington and Seoul Nuclear Security Summits.

President Barack Obama delivers remarks at Hankuk University of Foreign Studies in Seoul, Republic of Korea, March 26, 2012. The President discussed his Prague agenda to stop the spread of nuclear weapons and his commitment to nuclear energy as part of his comprehensive strategy to develop all sources of American energy. (Official White House Photo by Chuck Kennedy)

A ROAD MAP FOR U.S.-JAPAN NUCLEAR SECURITY WORKING GROUP

During the Nuclear Security Summit in Seoul, a number of related bilateral meetings and announcements occurred. Among them was an important announcement by U.S. and Japanese Heads of State on achievements made by the U.S.-Japan Nuclear Security Working Group. The working group was established at the U.S.-Japan Summit meeting in November 2010 with the responsibility to identify and coordinate tangible outcomes for the 2012 Nuclear Security Summit. A press release from the White House issued during the 2012 Summit outlined achievements made in nine goal areas.

NIS was vital in the development of the working group and its goals. In fact, six of the nine achievement areas benefitted from NIS contributions. Among other activities to support the U.S.-Japan Working Group, NIS assisted with regional workshops on INFCIRC/225/Rev. 5 and physical protection.

THE ROLE OF THE IAEA

Both the Washington and Seoul Summits emphasized the important role of the IAEA. NIS is closely involved in strengthening the IAEA by assisting with nuclear security training, assessments, and document development. All three activities exemplify what NIS will continue doing to meet U.S. law related to the physical protection of nuclear material.

In keeping with the Nuclear Nonproliferation Act of 1978, which requires the establishment and conduct of safeguards and security training for foreign officials responsible for nuclear material, NIS develops and conducts a full range of training courses across a broad spectrum of nuclear security topics. NIS offers these courses to policy officials, regulatory officials, enforcement personnel, and operators. Courses are tailored to the needs of foreign partners, ranging from nuclear newcomers to advanced nuclear States. In addition, now that INFCIRC/225/Rev.5 has been published, NIS also provides training on the overall policy aspects of INFCIRC/225, as well as specific technical areas.

NIS also assists the IAEA in conducting assessments of foreign countries' physical protection systems by supplying technical experts to IAEA International Physical Protection Advisory Service (IPPAS) missions. The IAEA conducts these assessment visits at the request of Member States that would like an independent review of their security practices. The assessments use INFCIRC/225 as the basis for reviewing minimum recommendations for protecting nuclear materials and facilities. During the 2010 Nuclear Security Summit, IAEA Member States were called to sign up for IPPAS missions, and the United States, United Kingdom, and France all committed to requesting an IPPAS mission following the Summit.

NIS continues to support the IAEA in the area of document development. "We provide expertise across the entire IAEA Nuclear Security Series (NSS) document structure," Krupa says. She also pointed to important current efforts where NIS is contributing to NSS implementing guides for INFCIRC/225 as an important next step in helping countries with the new recommendations, as called for by the 2012 Seoul Nuclear Security Summit.

NUCLEAR SECURITY CULTURE

The Seoul Summit Communiqué states, "Recognizing that investment in human capacity building is fundamental to promoting and sustaining a strong nuclear security culture, we encourage States to share best practices and build national capabilities…. In this regard, we welcome the establishment of Centers of Excellence…." NIS has answered this call and, to date, has engaged with two Centers of Excellence in Korea and Japan. NIS has played a significant role in developing these centers and its activities include contributions to the curricula, training, and test beds for evaluating physical protection devices. NIS is committed to supporting the long-term sustainability of these and other centers.

NUCLEAR MATERIALS

The international community has recognized that a terrorist gaining access to nuclear material is a threat to global security. To ensure that those with malicious intentions do not gain access to nuclear material or facilities, various countries made individual commitments during the Summits. Commitments include consolidating nuclear material on site, removing material from their territory, converting reactors from highly enriched uranium (HEU) to low enriched uranium (LEU), or better protecting material in their possession. Together with the Global Threat Reduction Initiative (GTRI), NIS has a role to play in achieving these commitments. While GTRI is involved in removing nuclear and radiological materials from civilian sites worldwide, NIS conducts assessments to ensure that adequate physical protection measures are afforded to U.S. nuclear material abroad.

PARTNERSHIPS IN ACHIEVING SUMMIT GOALS

These are just some of the ways NIS contributes to the objectives set at the Nuclear Security Summits. Krupa confirms that "NIS touches nearly every part of the Seoul Communiqué." She is quick to acknowledge, however, the importance of partnerships in making these contributions—not just across NNSA, but with the U.S. Interagency as well.

In addition, NIS leverages the technical expertise of the National Laboratories to achieve broader NNSA and U.S. policy goals set forth in the Nuclear Security Summits. "The National Labs play a key role in nuclear security program efforts," according to Krupa. "They are a vital component of what we do—not just to prepare for a summit but in the day-to-day program activities of NIS."

While the Nuclear Security Summits have not radically changed what NIS does, Krupa agrees that shining a spotlight on shared global concerns and the involvement of leaders from 53 States and international organizations at the Nuclear Security Summits has helped boost the momentum behind NIS efforts. As Gary Samore, Special Assistant to the President and White House Coordinator for Arms Control and Weapons of Mass Destruction, Proliferation, and Terrorism, put it before Seoul, "with leaders invested in making commitments, you're much more likely to get concrete action out of governments."

In addition to being the Deputy Director of the NIS Office of Nuclear Safeguards and Security, Melissa Krupa is the Team Leader of the International Nuclear Security Program within the Office of Nuclear Safeguards and Security, a position, among others, that she has held nearly 8 years. She has been with NNSA for 16 years.

NIS Plays Role in Peaceful Uses of Nuclear Technology Agreement with China

The U.S.–China Joint Coordinating Committee (JCC) meets annually under the framework of the U.S.–China Peaceful Uses of Nuclear Technology (PUNT) agreement. Anne Harrington, NNSA's Deputy Administrator for Defense Nuclear Nonproliferation, and Hao Weiping, Deputy Director General of Electric Power Department of the China National Energy Administration, co-chaired the meeting held in Washington, DC, April 9-10. Both sides reviewed general progress made under each of the five PUNT working groups, explored common interests, and identified next steps to initiate and strengthen technical collaborations in nuclear safety and security. While offices across NNSA are involved in the five PUNT working groups, Michele Dash-Pauls and Wayne Mei of NIS helped organize the JCC and were in attendance.

The PUNT Agreement—signed in 1998—is a formal government-to-government mechanism that facilitates U.S.-China bilateral technical cooperation in civil nuclear energy and nonproliferation. There are five working groups under PUNT: (I) Nuclear Energy Technologies; (II) Safeguards and Security; (III) Environment and Waste Management; (IV) Nuclear Emergency Management; and (V) Radiological Source Security. NIS contributes most significantly in Working Group II, particularly in the areas of export controls, safeguards, and nuclear forensics. Some specific activities of NIS in the past have included developing a Chinese language export control guidebook and conducting safeguards training for Chinese technical officials.

Dash-Pauls is the Acting Director for the NIS Office of Controls (ONC). Mei is the ONC Team Lead for Confidence Building Measures and the primary USG coordinator for the JCC, organizing input for the JCC across the U.S. Department of Energy (DOE) and with the Departments of State and Commerce and the Nuclear Regulatory Commission.

Hao Weiping, Deputy Director General of Electric Power Department of the China National Energy Administration, and Anne Harrington, NNSA's Deputy Administrator for Defense Nuclear Nonproliferation, co-chaired the 7th U.S.-China PUNT JCC Meeting.

China continues to take an ambitious approach to nuclear power expansion. According to the World Nuclear Association, there are 14 nuclear power reactors in operation across mainland China. To achieve its goals for increasing electrical generation capacity, the Embassy indicates China will have to build four or five reactors each year through 2020. At the JCC in April, Hao emphasized that China and the United States. both need to strengthen public acceptance of nuclear energy by advancing nuclear technology research and development, promoting personnel training, assuring reliable nuclear fuel supply and spent fuel and radioactive waste management concepts, and implementing National Security Summit objectives (see cover story).

"On a technical level, the U.S. and China have maintained very good cooperation over the years through the PUNT Agreement," said Dash-Pauls, who before joining NIS a year ago served as the Deputy Director at DOE's office in Beijing.

A major function of the Working Groups of the JCC is to share best practices. Particularly following the Fukushima accident of March 2011, Dash-Pauls says a significant lesson learned is to "recognize that an accident anywhere affects people everywhere." She also points out that not only does China have one of the most aggressive nuclear energy expansion plans in the world but it also wants to be an exporter of nuclear energy technology. "So it is in their interest to ensure the technology is safe."

With the expertise that NIS brings to PUNT and the ongoing technical cooperation between the United States and China through the JCC, both countries are helping to ensure the growth of nuclear power is being done safely and responsibly.

Michele Dash-Pauls joined DOE in 2001 and has been with NNSA since its inception. She served three years as Deputy Director for DOE in Moscow and three years as Deputy Director for DOE in Beijing before returning in 2011 to join NIS.

NIS Promotes Adherence to the IAEA Additional Protocol

BY MATTHEW VAN SICKLE

The International Atomic Energy Agency (IAEA) has made clear that Comprehensive Safeguards Agreements (CSAs) and global implementation of the Model Additional Protocol (AP) constitutes what is needed for effective safeguards verification. States with both a CSA and an AP in force allow the IAEA to be in a better position to provide credible assurances to the international community of both the absence of undeclared nuclear activities and that declared materials remain in peaceful nuclear activities. Consequently, the United States believes that a CSA along with an AP in force should be considered the international standard for IAEA safeguards. In order to encourage the remaining States to bring an AP into force as soon as possible, the United States joins the IAEA and others in offering assistance to States in the effective implementation of these safeguards instruments. Under NIS' International Nuclear Safeguards and Engagement Program (INSEP), the United States promotes universal adherence to the AP through technical partnerships that support States preparing for AP ratification and improve procedures in States currently implementing the AP.

INSEP holds an AP technical workshop in Iraq in 2011.

NIS has provided sustained support to a number of States—such as Serbia, Morocco, Kuwait, the United Arab Emirates, Vietnam, Thailand, Malaysia, Indonesia, Philippines, and Iraq—in the training, infrastructure, and organizational development needed for effective AP implementation. INSEP's cooperative efforts are tailored to the specific partner country and designed to achieve an agreed upon end-state for sustainability. Such technical engagement may include trainings to determine possible AP-related activities, enhancing understanding of AP requirements, conducting outreach planning, and providing guidance for identifying and reporting manufacturing and exports listed in the AP. INSEP also collaborates with partner countries in AP-related infrastructure and organizational development, such as the establishment or improvement of legal frameworks, regulatory documents, software systems to collect and submit declarations, and procedures to conduct industry outreach and establish communication networks among stakeholders.

INSEP's international technical assistance is done along with the IAEA and is complementary to the IAEA's mission, as these cooperative efforts support effective implementation with IAEA safeguards obligations. INSEP continues to increase support and direct programmatic resources toward expanding AP international technical assistance to new partners.

For instance, INSEP, in close coordination with the IAEA, initiated engagement in AP implementation with Iraq's National Monitoring Directorate (INMD) in 2011. INSEP held three technical workshops with Iraq, focusing on the review and evaluation of draft AP declarations and complementary access mock simulations. In the most recent workshop, INSEP and the IAEA provided training to INMD on the use of handheld safeguards instruments that can be used to characterize nuclear material.

Matthew Van Sickle serves as the Team Leader for the International Nuclear Safeguards and Engagement Program in the NIS Office of Nuclear Safeguards and Security. Van Sickle joined NIS in 2006 as a Nonproliferation Graduate Fellow and has served as a program manager for nuclear safeguards and nonproliferation projects in the Middle East, North Africa, and Southeast Asia. Van Sickle holds Masters Degrees in International Studies and Public Affairs from the University of Washington.

AP DECLARATION HELPER

INSEP's AP Declaration Helper software tool utilizes a simple, web-based or desktop interface to assist safeguards managers in determining which information to report to the IAEA. The Declaration Helper includes a built-in cross referencing feature that allows users to learn more about specific AP requirements and definitions. INSEP provides training on this tool and the IAEA's Protocol Reporter as part of its outreach efforts.

This free software tool is available for use or download at *www.nnsa.energy.gov/aphelper*.