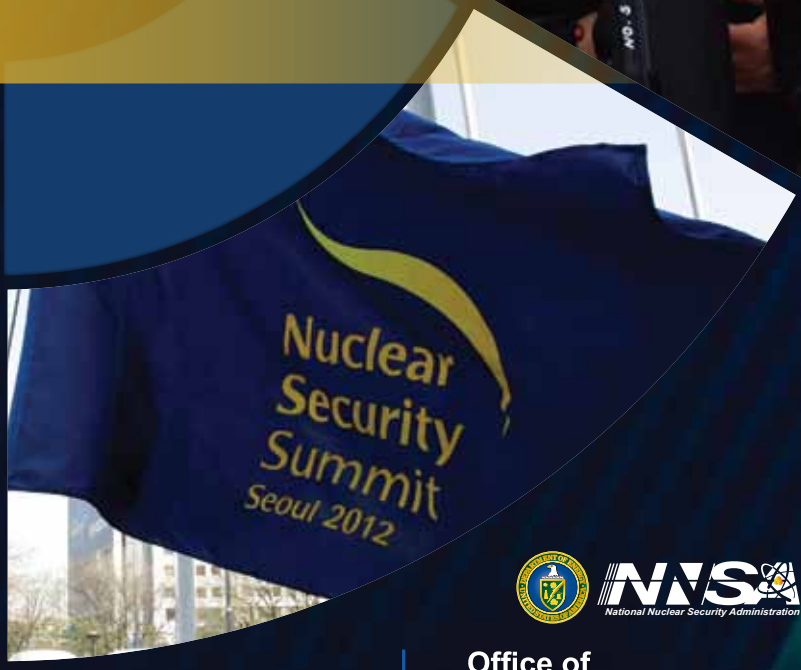
FY 2012 Annual Report

Addressing the Issues of Today



National Nuclear Security Administration

Office of
Nonproliferation
and International
Security (NIS)

> "... current trends of concern will continue to pose challenges over the next ten years, and in many cases are expected to broaden and increase in likelihood."

DOE/NNSA Office of Defense Nuclear Nonproliferation
Over-the-Horizon Opportunity Analysis, 2017-2021

Table of Contents

Executive Message 1

Meeting National Policy Objectives 2

The Four Pillars of NIS 3

Significant Accomplishments in FY 2012:

- Next Generation Safeguards 4
- Strengthening Safeguards for Gas Centrifuge Enrichment Plants 5
- UF_6 Cylinder Assay 6
- Strengthening the Security of Nuclear Materials and Facilities 7
- Working with States to Meet Nuclear Security Summit Deliverables 8
- Promoting Adherence to the IAEA Additional Protocol 9
- Scientist Engagement Activities Support Fukushima 10
- NIS Support to Supplier Regimes—The Example of Chem/Bio-Warfare Controls 11
- INECP Expands Regional Capacity Building with Key Partners 12
- Deterring Illicit Trafficking through Nuclear Forensics Engagement 14
- Hot Cell Training in Tbilisi, Georgia 16
- Monitoring HEU Processing 17
- U.S. and UK Cooperate on a Warhead Monitored Dismantlement Exercise 18
- PPRA has Historic Anniversary in FY 2012 19
- Leadership in Amending U.S. Regulations 20
- Nuclear Suppliers Group 21
- Global Partnership Working Group 22
- Reducing the Dangers of Nuclear Confrontation in South Asia 23

Acronyms and Abbreviations 24

Executive Message

The NIS Mission Fulfills Multiple Mandates

- Atomic Energy Act of 1954
- Arms Export Control Act of 1976
- International Emergency Economic Powers Act (1977)
- Nuclear Nonproliferation Act of 1978
- National Security Administration Act, Updated 2010
- UN Security Council Resolutions 1540 and 1887
- Executive Order 12981

2012 marked another important year for the U.S. Department of Energy/National Nuclear Security Administration's (DOE/NNSA) Office of Nonproliferation and International Security (NIS). Our priorities continue to be driven by our statutorily mandated mission, the 2010 Nuclear Posture Review, the 2010 National Security Strategy, and the Administration's nuclear nonproliferation and security objectives. Expected bipartisan support means that NIS will remain at the forefront of how the United States fashions as well as implements policies, programs, and technologies that address nonproliferation and nuclear security issues. We will continue to lead the development of proactive and innovative nonproliferation and security solutions.

With our long-standing policy-based mission, NIS remains relevant to the issues of today. States interested in the use of civilian nuclear energy are on the rise, others continue to develop nuclear weapons or capabilities outside of international regime oversight, and non-State actors persist in their attempts to acquire nuclear materials and technology. NIS engages with more than 70 countries, in addition to international organizations, to build international partner capacity to reduce nuclear dangers while promoting beneficial nuclear technology. We bring our unique blend of scientific capability, technical experience, and policy understanding to combat the proliferation of weapons of mass destruction (WMD) materials, technology, and expertise. More than any other U.S. Government organization, NIS, backed by the extensive capabilities of our National Laboratories, encompasses the full spectrum of the WMD understanding and continues to work effectively at the individual level with sovereign indigenous scientific communities.

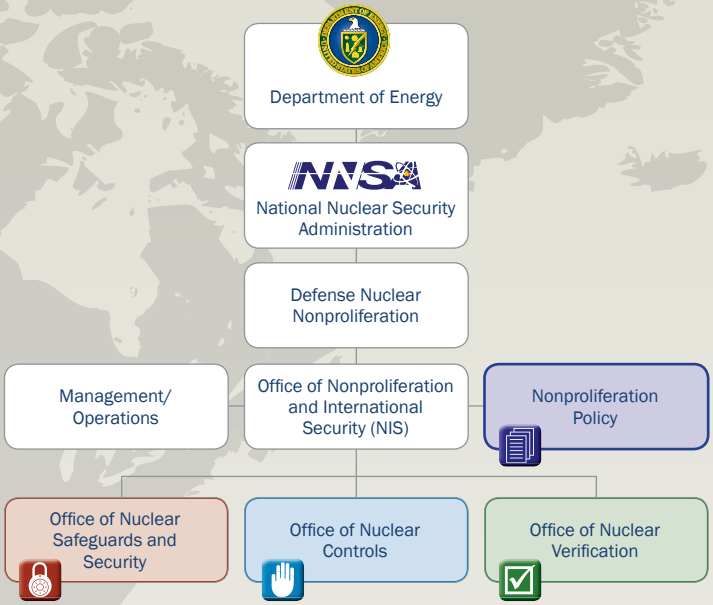
In 2012, NIS chaired the Office of Defense Nuclear Nonproliferation (DNN) "Over the Horizon Opportunity Analysis" study group, which was charged with examining evolving WMD threats and trends for the 2017–2021 timeframe and determining the resulting implications for the DNN. As we move forward, we will continue to examine our program priorities to ensure that we are positioned properly, working effectively, and fully prepared to address the challenges of this changing WMD landscape. NIS's unique combination of policy, technical, and implementation expertise and experience will continue to serve DNN and the broader nonproliferation and international security community well. The NIS mission is sound and we stand ready to continue to serve as a driving force in the effort to combat the spread of WMD technology and expertise.

I encourage you to read the following pages of the NIS FY 2012 Annual Report to see specific examples of our accomplishments that fulfill our mission to support the nation's interest in global security through the peaceful uses of nuclear materials and technology.

Kasia R. Mendelsohn

Kasia Mendelsohn
Assistant Deputy Administrator
NNSA Office of Nonproliferation and International Security

The NIS Mission is to prevent the proliferation of nuclear weapons, materials, technology, and expertise.



Meeting National Policy Objectives

As part of DOE/NNSA, NIS brings together a unique capability set in the areas of nuclear safeguards and security, controls, monitoring and verification, and policy into one organization. Within the DOE/NNSA Office of Defense Nuclear Nonproliferation, NIS is the organization most directly associated with the policy issues of the nonproliferation regime and offers management and technical programs to strengthen the regime.

NIS activities and expertise are an integral part of the U.S. Government response to the nonproliferation issues and concerns in today's headlines. Whether working up front or behind the scenes, we draw on the specialized capabilities of our U.S. National Laboratory complex to advance the national security objectives of the Administration.

Throughout FY 2012 and every year, NIS represents DOE/NNSA in many coordinating committees that formulate U.S. nonproliferation policies, initiatives and strategies.

NIS coordinates with the following:

- Congress
- Department of State
- Department of Homeland Security
- Department of Justice
- Department of Defense
- Department of Treasury
- Department of Commerce
- National Security Council
- Intelligence Community
- National Laboratories
- More than 70 foreign governments around the globe
- Multilateral organizations, including the International Atomic Energy Agency (IAEA) and the Nuclear Suppliers Group

The Four Pillars of NIS

Office of Nuclear Safeguards and Security

The Office of Nuclear Safeguards and Security focuses on programs that prevent the diversion and theft of nuclear materials and the sabotage of nuclear facilities. Through the Next Generation Safeguards Initiative, the office is supporting the development of the policies, concepts, technologies, expertise, and international safeguards infrastructure necessary to sustain and strengthen the international safeguards system. Through the International Nuclear Security program, the office helps ensure the physical protection of nuclear materials and facilities worldwide.

- Next Generation Safeguards Initiative
  - » Safeguards Policy
  - » Safeguards Engagement
  - » Safeguards Technology Development
- International Nuclear Security

Office of Nuclear Controls

The Office of Nuclear Controls aims to detect and prevent the illicit trafficking of WMD-related material, equipment, technology, and expertise. The office works to build capacity both within the U.S. Government and among foreign partners to detect and prevent illicit WMD-related commodity, technology, and knowledge transfer. The office also provides technical support for U.S. Government export licensing and interdiction activities.

- International Nonproliferation Export Control Program
- Global Initiatives for Proliferation Prevention
- Confidence-Building Measures
- Export Control Review and Compliance
- Weapons of Mass Destruction Interdiction

Office of Nuclear Verification

The Office of Nuclear Verification develops policy and technical solutions for transparent arms reductions, treaty monitoring, and verification of violations of treaties and other commitments. The office develops strategies to help negotiate and ratify treaties and agreements that achieve U.S. national security objectives as well as technologies to monitor compliance.

- Warhead Dismantlement and Fissile Material Transparency
- Nuclear Noncompliance Verification
- HEU Transparency Program

Nonproliferation Policy

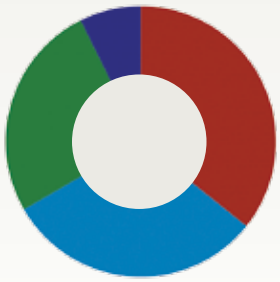
The Nonproliferation Policy function resident within the NIS front office and other NIS offices provides technical and scientific expertise to assist with developing and implementing DOE/NNSA nonproliferation and arms control policy to reduce WMD risk. NIS technical experts work with Interagency and international counterparts

- Global Regimes
- Regional Analysis and Engagement
- Multilateral Supplier Policy

NIS Funding in FY 2012 (in Millions)

Office of Nuclear Safeguards and Security	$54.897
Office of Nuclear Controls	$47.444
Office of Nuclear Verification	$39.969
Nonproliferation Policy	$11.284

Total FY 2012 Enacted Budget: $153.594M



Next Generation Safeguards

On July 2–4, 2012, NNSA, together with the Vietnam Agency for Radiation and Nuclear Safety, successfully concluded the Fourth International Meeting on Next Generation Safeguards in Hanoi. The meeting was organized by NIS's Next Generation Safeguards Initiative (NGSI) and brought together more than 80 experts from 27 countries, two regional inspectorates, and the IAEA to discuss practical steps related to the implementation of international safeguards.

Meeting participants:

- shared lessons learned among IAEA Member States related to establishing and maintaining a State System of Accounting for and Control of Nuclear Material (SSAC);
- exchanged information and enhanced understanding regarding the role of SSACs and Safeguards Regulatory Authorities, which are the national entities responsible for collecting and reporting information about a country's nuclear program to the IAEA, in the practical implementation of Comprehensive Safeguards Agreements and Additional Protocols; and
- identified areas for mutual cooperation among workshop participants.

Participants represented the broad spectrum of nuclear development, from planning stages to full fuel-cycle capabilities. They interactively addressed topics including the legal and regulatory framework for effective safeguards, human resource development, and competencies needed for a strong system.

"We must modernize the technology we use, improve the training, and increase the resources we devote to ensuring that nations are not diverting nuclear materials, technology, and know-how from peaceful programs to weapons program. That is what the Next Generation Safeguards Initiative is all about."

NNSA Administrator Thomas D'Agostino

Next Generation Safeguards Initiative

International safeguards, a key component of the Nuclear Non-Proliferation Treaty, are a set of technical measures administered by the IAEA that provide credible assurance to the international community that nuclear material is not being diverted from peaceful purposes.

Since 2008, NGSI has developed and applied the safeguards policies, concepts and approaches, technologies, expertise, and infrastructure necessary to strengthen and sustain the international safeguards system as it evolves to meet new challenges.

NIS organized the Fourth International Meeting on Next Generation Safeguards, which brought together more than 80 experts from 27 countries, two regional inspectorates, and the IAEA.

Strengthening Safeguards for Gas Centrifuge Enrichment Plants

The Washington Post

U.N. inspectors report worrisome steps in Iran's nuclear program

By Joby Warrick, November 16, 2012

Iran has reached another milestone in its nuclear program, U.N. inspectors reported Friday, saying the country has completed work on an underground factory for enriched uranium. Western officials

NIS sponsored a meeting of Gas Centrifuge Enrichment Plant (GCEP) technology stakeholders at the University of Virginia in Charlottesville, Virginia, on May 17, 2012. The meeting was attended by 38 professionals from 18 organizations representing governments, industry, regional inspectorates, and IAEA. The primary objectives of the meeting were to discuss priorities for strengthening safeguards at commercial GCEPs, to highlight NGSI-sponsored work with near-term implementation potential, and to explore opportunities to refine new GCEP safeguards technologies and approaches through field trials.

Strengthening GCEP safeguards is a priority for the United States and the IAEA. Uranium needs to be enriched to produce power, but uranium enrichment, along with plutonium reprocessing, is one of the two main pathways to acquiring fissile material for nuclear weapons.

An important aspect of safeguarding GCEPs is determining the best method of collecting safeguards-relevant information while protecting the operators' sensitive proprietary information. To be successful, new measures must be acceptable to the IAEA, operators, and governments—each with their own sets of concerns.

NGSI is sponsoring several projects at U.S. National Laboratories that could provide benefits to all stakeholders. For example, the new technologies for measuring the enrichment of UF_6 cylinders or the use of secure and authenticated operator data from parts of the enrichment process could reduce the need for expensive and intrusive IAEA sampling or equipment. Presentations from the meeting described results from successful field trials that took place in FY 2011 and FY 2012 and solicited practical advice on how best to make promising NGSI technologies acceptable to the stakeholders and ready for implementation in commercial GCEPs.

Uranium Enrichment

Natural uranium primarily contains two isotopes, U-238 (99.3 percent) and U-235 (0.7 percent). The concentration of U-235, the fissile isotope in uranium, needs to be increased to 3 to 5 percent for practical use as a nuclear power reactor fuel. One way to enrich uranium is by using gas centrifuges. Gas centrifuges spin UF_6 gas at high speeds, creating a centrifugal force that separates the isotopes by forcing the heavier U-238 further outward in the centrifuge.

Iranian President Mahmoud Ahmadinejad at the Natanz uranium enrichment facilities, April 8, 2008.

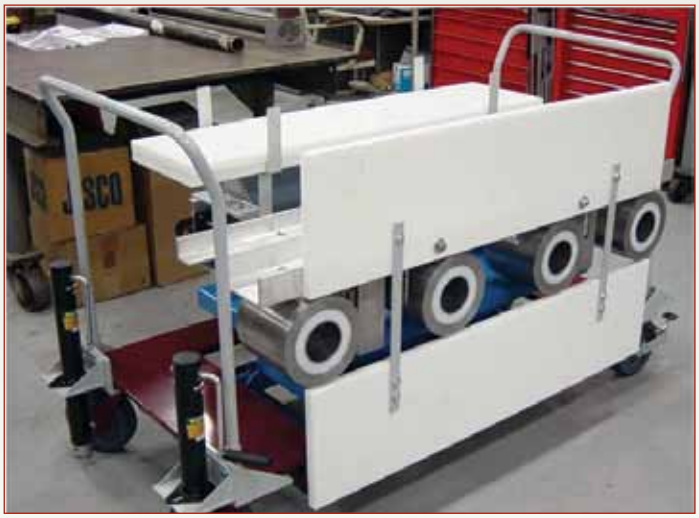
UF_6 Cylinder Assay

Through its NGSI, NIS is developing two new technologies to provide IAEA inspectors with more accurate, timely, and reliable measurements for the contents of uranium hexafluoride (UF_6) cylinders. The two complementary methods currently under development are Los Alamos National Laboratory's (LANL) Passive Neutron Enrichment Meter (PNEM) and Pacific Northwest National Laboratory's (PNNL) Hybrid Enrichment Verification Array (HEVA). While present inspections infer the overall uranium enrichment level of a UF_6 cylinder by measuring the signal from the small fraction of material located near the cylinder wall, the new techniques utilize neutron-based signatures that enable prompt, full-volume verification of uranium enrichment. As a result, these technologies could allow the IAEA to verify the contents of an entire UF_6 cylinder in a fast, precise, and non-intrusive manner.

In FY 2012, prototypes of both technologies were tested in operational commercial facilities in the United States and abroad. Successful tests were conducted at the Westinghouse Columbia Fuel Fabrication Facility in South Carolina; the AREVA fuel fabrication facility in Richland, Washington; and the uranium enrichment plant at Rokkasho in Japan. Further joint demonstrations with EURATOM at European facilities are planned for the beginning of FY 2013. The active participation by commercial partners demonstrates that the measurement capabilities of these systems are valuable not only to IAEA inspectors but to plant operators as well since the technologies also can be used within plants to more easily verify the quality and quantity of product and inventory.

Verifying UF_6 Cylinder Contents

The UF_6 used in uranium enrichment is typically stored in large steel cylinders. A single UF_6 cylinder in normal commercial fuel cycle processes can contain enough U-235 for two nuclear weapons. With about 20,000 cylinders in active use worldwide at any time, the reliable and timely verification of cylinder contents is a very important element of international nuclear safeguards. Using current techniques, verifying the contents of a UF_6 cylinder is technically challenging and resource-intensive. New technologies offer improvements in verification data accuracy, timeliness, and reliability.



The Hybrid Enrichment Verification Array.

The Passive Neutron Enrichment Meter, being tested at the Rokkasho uranium enrichment plant in Japan.

Strengthening the Security of Nuclear Materials and Facilities

the guardian

Burma to allow in nuclear inspectors

Burmese government says it will sign agreement with IAEA to dispel suspicions of secret nuclear programme

Julian Borger, diplomatic editor
guardian.co.uk, Wednesday 21 November 2012 11.43 EST

Burma's government has said it will open the country to comprehensive international inspection in an effort to demonstrate that it does not have a covert nuclear programme.

The regime said it would sign an agreement with the International Atomic Energy Agency (IAEA) that would, if implemented, mark an i

During FY 2012 the International Nuclear Security (INS) Program's outreach and training support provided nearly 300 foreign officials from over 60 countries with information on the most recent technical and practical developments regarding the physical protection of nuclear material.

Cooperation with the IAEA included updating training material for the International Training Course (ITC) on the Physical Protection of Nuclear Materials and Nuclear Facilities to address the new recommended requirements introduced in the Nuclear Security Series document on "The Physical Protection of Nuclear Material and Nuclear Facilities," INFCIRC/225/Rev.5.

In addition to traditional areas of bilateral engagement to build capacity in key countries, INS provided three countries with a workshop on conducting nuclear facility vulnerability assessments, worked with two countries on the use of software for supporting the vulnerability assessment process, and provided one country with a workshop for identifying vital areas in nuclear facilities.

INS also initiated a broad outreach and training effort to promote the implementation of INFCIRC/225/Rev.5 and to support the enhancement of physical protection infrastructure with key partner countries. In promoting the implementation of INFCIRC/225/Rev.5, INS developed a two-day workshop to familiarize participants with key changes to understand the nature of those changes and how these changes would affect their nuclear security efforts. The INFCIRC/225/Rev.5 workshop was provided to eight partner countries.

About INS

Facing the potential vulnerability of nuclear material and facilities to terrorists and other threats, the INS Program works to strengthen the security of nuclear materials and facilities worldwide. INS works in cooperation with the IAEA and IAEA Member States to conduct training, technical assistance, assessment visits, and other engagement. INS also provides policy and technical assistance to the IAEA's Office of Nuclear Security, including support for document and curriculum development and instructors for nuclear security training courses.

INS has led over 170 assessments in nearly 50 countries worldwide to verify that the physical protection of U.S.-obligated nuclear material meets the recommendations contained in the current version of INFCIRC/225.

Working with States to Meet Nuclear Security Summit Deliverables

In FY 2012, INS also continued providing training and engagement support to partner countries in support of their 2010 Washington and 2012 Seoul Nuclear Security Summit Commitments, including bilateral work with Japan and the Republic of Korea to support development of their new nuclear security training centers of excellence.

The Japan Atomic Energy Agency (JAEA) established the Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) in Tokai, Japan, in December 2010. INS and JAEA are collaborating to develop training materials and curriculum, a nuclear security test bed, and information technology training tools for ISCN. INS worked with JAEA to offer the first training for international participants at ISCN in October 2011, including courses on the Physical Protection of Nuclear Materials and Nuclear Facilities and INFCIRC/225/Rev.5, and will continue working with JAEA to expand and further develop the ISCN training program into FY 2013.

INS and the Korea Institute for Nuclear Nonproliferation and Control (KINAC) also launched a project in April 2011 for nuclear security support at KINAC's International Nuclear Security Academy (INSA). Construction of INSA began in March 2012. INS will continue working with KINAC on development of training curricula, cooperation on a nuclear security technology test bed, and eventual co-hosting of international workshops on nuclear security when INSA is fully operational in 2014.

INS and JAEA are collaborating to develop training materials and curriculum, a nuclear security test bed, and information technology.

Promoting Adherence to the IAEA Additional Protocol

In FY 2012, the NIS International Nuclear Safeguards and Engagement Program (INSEP) completed a series of workshops started in 2011 with Iraq, focusing on the review and evaluation of draft Additional Protocol (AP) declarations and simulations related to complementary access. In the most recent workshop, INSEP and the IAEA provided training to the Iraq National Monitoring Directorate (INMD) on the use of handheld safeguards instruments that can be used to characterize nuclear material. These devices will enable INMD to carry out domestic inspections of their facilities and further enhances its nuclear safeguards capacity.

The IAEA has made clear that Comprehensive Safeguards Agreements (CSAs) and global implementation of the Model AP constitute what is needed for effective safeguards verification. States with both a CSA and an AP in force put the IAEA in a better position to ensure the peaceful nature of declared nuclear activities and to provide credible assurances of the absence of undeclared 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.

INSEP held AP technical workshop for Iraq in 2011 and 2012.

International Nuclear Safeguards Engagement Program

The NIS INSEP effort promotes universal adherence to the IAEA Additional Protocol through technical partnerships that support States preparing for AP ratification and improve procedures in States currently implementing the AP.

NIS tailors its assistance through INSEP to the specific country being helped. Specific offerings can include training 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.

States assisted through INSEP have included Serbia, Morocco, Kuwait, the United Arab Emirates, Vietnam, Thailand, Malaysia, Indonesia, Philippines, and Iraq.

Scientist Engagement Activities Support Fukushima

After the incident at the Fukushima Daiichi Nuclear Power Plant, the Japanese government asked the International Science and Technology Center (ISTC) in Moscow to conduct a review of all completed projects for their applicability to address issues stemming from the nuclear incident. Supported by an initial DOE pledge of $2M, ISTC and the Science and Technology Center in Ukraine (STCU) started cooperating on a joint program for Severe Accident Management, Decommissioning and Environmental Remediation. This important program draws on years of ISTC and STCU research that has focused on regional issues such as radiological pollution from Chernobyl in Ukraine and Belarus, contamination from the nuclear bomb test site of Semipalatinsk in Kazakhstan, and leakage from the Mayak nuclear facilities into the surrounding river basin in Russia.

As one of the key funders of this initiative, the Global Initiatives for Proliferation Prevention (GIPP) has taken a lead role in coordinating with ISTC, STCU, and Japan on the program and has provided experts from the U.S. National Laboratories to work with Japanese and European Union (EU) experts on supporting activities. To date, GIPP has jointly organized two symposia with ISTC, STCU, and various Japanese Ministries. The symposia provided ISTC and STCU participants the opportunity to present capabilities, methods, and technologies to Japanese experts and decision makers involved in coordinating the Fukushima response. Moreover, the symposia showcased relevant completed ISTC and STCU projects and facilitated relationships between Japan and former Soviet research institutions to assist with the remediation efforts.

GIPP and the Japanese Ministry of Education, Culture, Sports, Science & Technology (MEXT) also coordinated with ISTC and STCU to launch a call for proposals for projects related to land decontamination and monitoring in Fukushima. U.S. National Laboratory experts worked closely with Japanese and EU scientists to evaluate over 100 proposals. GIPP, MEXT, and other interested parties will select projects for funding based on scientific merit and applicability to Fukushima. U.S. and Japanese scientists will work closely with ISTC and STCU scientists and ISTC member countries to make sure that the selected projects develop methods and technologies that can play a significant role in Fukushima and other remediation efforts around the world.

The GIPP program is coordinating with other organizations to provide technical advice to Japan regarding issues following the incident at the Daiichi Nuclear Power Plant.

Global Initiatives for Proliferation Prevention

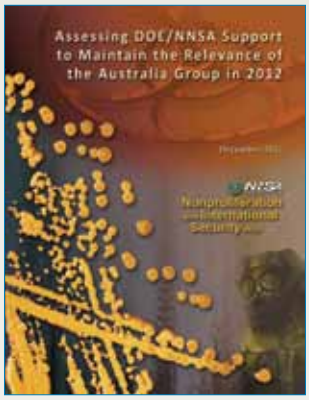
Since 1994 the Global Initiatives for Proliferation Prevention program within NIS has facilitated partnerships between former WMD experts, U.S. National Laboratories, and U.S. industry to develop innovative technology solutions in such priority areas as nonproliferation, counterterrorism, alternative energy, and medical devices. GIPP works closely with other U.S. Government agencies and international partners, primarily through two international organizations: the International Science and Technology Center and the Science and Technology Center in Ukraine. The value of these scientific partnerships has been clearly established through the many commercialized technologies and research and development awards that have resulted from GIPP projects.

NIS Support to Supplier Regimes—The Example of Chem/Bio-Warfare Controls

The Australia Group

The Australia Group is an informal, voluntary forum of countries cooperating to ensure that exports of certain technologies or materials do not contribute to the development of chemical or biological weapons by terrorists or states of concern. At the same time, the Australia Group strives to ensure that export controls do not hinder legitimate trade and technical cooperation in the chemical and biological sectors.

NIS created a report to document efforts, accomplishments, and future directions for DOE/NNSA support to the Australia Group.



The NIS Office of Nuclear Controls participated as a key member of the U.S. delegation to the 2012 Australia Group (AG) Annual Plenary and Technical Experts Meeting held in Paris in June 2012. NIS also participated in the February 2012 inter-sessional meeting held in Ottawa. NIS delivered three technical scientific presentations to inform AG regime members of new and evolving technologies that may pose proliferation risks. NIS also provided expert technical evaluations of U.S. and foreign proposals to amend the AG Common Control Lists, ensuring that the AG remains relevant and effective in the face of both emerging technologies and current proliferation concerns. Overall, technical assistance from NIS has been instrumental in a number of successful U.S. and foreign initiatives to enhance best practices and to prevent the proliferation of dual-use chemicals, biological materials, and related equipment.

Biological Weapons Convention

The Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and their Destruction (BWC or BTWC), entered into force on March 26, 1975. Since the initial Review Conference (RevCon) in 1980, States Parties have met every five years to "review the operation of the Convention."

Throughout most of December 2011, an interagency team, including a representative from NIS, served in Geneva as members of the U.S. delegation to the Seventh BWC RevCon, led by Secretary of State Hillary Clinton and Ambassador Laura Kennedy. At the Seventh RevCon, the United States worked with other like-minded States to set out a meaningful five-year work plan for high-priority areas, such as relevant developments in science and technology, cooperation and assistance (under which the United States seeks to advance broad health security objectives), and strengthening national implementation of the Convention. During the annual inter-sessional period, there will be a Meeting of Experts and a Meeting of States Parties convened in Geneva to discuss these issues.

During the Seventh BWC RevCon, Secretary of State Hillary Clinton announced the U.S. approach, vision, and objective for a new Bio-Transparency and Openness Initiative. Work on that initiative already has begun. In July 2012, NIS representatives participated in a visit to the U.S. biodefense facility at Fort Detrick in Maryland. The tour was conducted for ambassadors from eight BWC Member States. U.S. officials from the Departments of Defense, State, Health and Human Services, Agriculture; other agencies; and the National Security Staff also participated.

Additionally, representatives from NIS, the U.S. interagency, and approximately 25 BWC member countries participated in the International Conference on Health and Security, a U.S. Government-sponsored conference on the nexus of health and security held in Washington, DC in September 2012.

The tour and conference underscore the U.S. commitment to building an environment of openness and collaboration and are part of a series of steps the United States is taking to demonstrate its support for the Convention.

INECP Expands Regional Capacity Building with Key Partners

The NIS International Nonproliferation Export Control Program (INECP) works with over 70 partners to strengthen their national export controls to prevent the proliferation of materials, equipment, and technology required to manufacture WMD. Specifically, INECP helps partners build their capacity to appropriately regulate legal dual-use transfers and interdict illicit dual-use transfers.

During FY 2012, INECP made significant strides in establishing regional expert networks in the former Soviet Union (FSU), Europe, Asia, and Latin America that helped participating governments better implement their national systems of controls. These technical expert working groups (TEWGs) build upon existing bilateral export control partnerships and serve as sustainable platforms for ongoing regional collaborations while enabling the United States to reduce its footprint and target its resources. Discussions at the meetings made clear that the detection of illicit transfers remains a significant challenge for all countries and that sustained work is needed for the international community to keep pace with emerging proliferation threats and smuggling tactics.

In May, INECP and Dutch Customs organized the first-ever European Commodity Identification Training (CIT) Developers' Conference in the Netherlands, which brought together CIT implementers from ten EU countries to discuss their CIT programs, challenges, and solutions. Information exchanged at the meeting affirmed the importance of INECP's CIT train-the-trainer approach to improve physical inspection practices and increase the number of WMD-related commodity seizures.

In June, INECP conducted its eighth TEWG meeting for specialists from nine countries of the FSU. That same month, INECP and the Department of State's Export Control and Related Border Security (EXBS) program hosted an Asian WMD Strategic Trade Experts Network workshop for subject matter experts from Australia, Indonesia, Malaysia, Philippines, Singapore, South Korea, Thailand, and Vietnam. Both groups' work resulted in recommendations for future collaborative activities, including the development of online resources, reference materials, and a CIT developers' forum similar to the event held for the EU.

Workshop participants check routes for the transfer of WMD-related dual-use items listed on shipping documents in order to assess the proliferation risk associated with the transfer.

INECP's work on expert networks in the Western Hemisphere and Africa has built upon several regional outreach activities under the auspices of the World Customs Organization and the Organization for the Prohibition of Chemical Weapons. In August, Brazil and INECP co-hosted a TEWG, which brought together partners from Argentina, Brazil, and South Africa. The participants stated that they face many of the same challenges and opportunities in their efforts to strengthen regional export control norms. Specialists shared best practices, engaged in joint problem solving, and discussed opportunities to undertake regional outreach and joint capacity-building projects with neighbors whose export control systems are still in the early stages of development.

A workshop participant looks for suspicious dual-use commodities in a shipping container as part of a practical exercise.

Workshop participants examine shipping documents during a practical exercise focused on targeting suspect shipments for physical inspection.

INECP Partners with the E2C2

NIS, through INECP, has agreed to partner with the Export Enforcement Coordination Center (E2C2) to assist U.S. enforcement agencies in training of their export control officers on dual-use commodities used in the manufacture of WMD and their means of delivery.

The President established the E2C2 by Executive Order 13558 on November 9, 2010, as part of the Export Control Reform Initiative. The E2C2 is the designated focal point for the coordination of export enforcement efforts, with representation from eight departments and fifteen agencies across the U.S. Government. The E2C2 serves as a conduit between Federal law enforcement agencies and the intelligence community and strives to eliminate gaps and duplication in performing investigations of violations of U.S. export control laws.

The E2C2 is housed within the Department of Homeland Security, with Deputy Directors from the Federal Bureau of Investigation and the Department of Commerce. NIS represents DOE at the E2C2 and coordinates with other relevant DOE offices, such as the Office of Inspector General and the Office of Intelligence and Counterintelligence, to represent all DOE equities. NIS provides export licensing, interdiction, and technical expertise in WMD-related areas to support the export enforcement community.

The training partnership with NIS will further strengthen the E2C2 interagency effort by ensuring that WMD-related commodity familiarization training is available to enforcement agencies involved in the prevention of WMD proliferation.

Deterring Illicit Trafficking Through Nuclear Forensics Engagement

The Washington Post

wp OPINIONS

Home > Collections > Nuclear Materials

Time to better secure radioactive materials

By Yukiya Amano, March 25, 2012

The International Atomic Energy Agency is aware of more than 2,000 confirmed cases of illicit trafficking and other unauthorized activities involving nuclear and other radioactive material in the past 18 years. In a sting operation in Moldova last year, police seized a quantity of highly enriched uranium — material that can be used in a nuclear weapon — from an individual who was trying to sell it.

Most cases of attempted trafficking do not involve nuclear materials but, rather, radioactive materials of the sort held in hospitals, factories and many other locations worldwide that are generally not as well protected as nuclear facilities.

Combating the threat of nuclear terrorism and the illicit trafficking of nuclear and other radioactive material requires a comprehensive global response involving national governments and regional and international organizations. Nuclear forensics can serve as a tool to help determine the origin of material out of regulatory control and provide evidence for the prosecution of acts of illicit trafficking and malicious uses.

The NIS Confidence-Building Measures (CBM) Program is working bilaterally, multilaterally, and regionally to develop international standards for core capabilities in nuclear forensics, such as national nuclear forensics libraries, and to support joint research projects in the area of technical nuclear forensics. Specifically, CBM works with advanced and emerging nuclear states and organizations such as the IAEA, the Global Initiative to Combat Nuclear Terrorism (GICNT), and the Nuclear Forensics International Technical Working Group (ITWG).

Examples of CBM partnership activities in FY 2012 include:

- Engaging with advanced fuel cycle partners such as France, Japan, and the EU to support research in the field of nuclear forensics, to promote scientific best practices, and to build confidence that various materials-characterization techniques can lead to equally valid results.
- Supporting the development of standards for core nuclear forensics capabilities. CBM played an instrumental role in developing a common set of capabilities for basic nuclear forensics analysis to be promoted among States that are in the process of creating a nuclear forensics infrastructure. Specifically, CBM supported the IAEA's development of its Nuclear Security Series 2 document, *Nuclear Forensics in Support of Investigations* (formerly *Nuclear Forensics Support*), and co-sponsored a Nuclear Forensics Methodologies Course with the IAEA to provide technical information and a hands-on learning environment focused on the core capabilities for officials from 12 IAEA Member States. This course was held with the support of the United Kingdom's AWE, the Australian Nuclear Science and Technology Organization, and the European Commission's Joint Research Center-Institute for Transuranium Elements.
- Working to advance national nuclear forensics libraries. CBM worked directly with partners such as Japan, South Korea, and Ukraine to establish national nuclear forensics libraries and provided technical guidance to the U.S. interagency and the IAEA to devise common standards for such libraries. *(See inset.)*

Nuclear Forensics

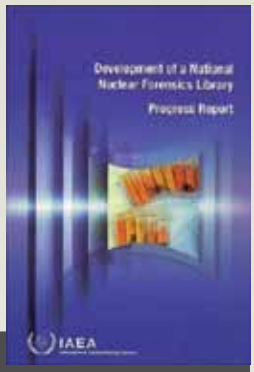
"Nuclear forensics is the analysis of intercepted illicit nuclear or radioactive material and any associated material to provide evidence for nuclear attribution. The goal of nuclear analysis is to identify forensic indicators in interdicted nuclear and radiological samples or the surrounding environment, e.g. the container or transport vehicle. These indicators arise from known relationships between material characteristics and process history. Thus, nuclear forensic analysis includes the characterization of the material and correlation with its production history."

IAEA Nuclear Security Series 2
Nuclear Forensics in Support of Investigations

The CBM Program within NIS develops and provides nuclear forensics training in partnership with the IAEA and others.

Nuclear forensics can provide evidence for the prosecution of acts of illicit trafficking of nuclear materials.

By collaborating with a wide variety of international and domestic organizations, the CBM Program is helping to build global nuclear forensics capabilities that are essential to a comprehensive nuclear security architecture.



National Nuclear Forensics Libraries

"The responsibility for establishing and maintaining a nuclear forensics library as part of a comprehensive nuclear security programme rests with the State."

IAEA Progress Report
Development of a National Nuclear Forensics Library
March 2012

NIS nuclear forensics activities play a major role in helping international partners to develop their own National Nuclear Forensics Library (NNFL). Fundamentally, the science of nuclear forensics is comparative in nature. NNFLs are a powerful tool for nuclear security because they allow States to compare unknown materials with known references to gain valuable information about the material's origin. This comparison is only possible, however, if a country has an accurate understanding of the nuclear materials within its borders. An NNFL enables a State to assess whether seized material originated from within that State or elsewhere.

Engaging with international partners in support of national libraries yields many benefits, including developing international consensus on what material characteristics are important to include in libraries, building confidence multilaterally through technical exchanges, and strengthening relationships by cooperating on nuclear forensics investigations. Investments in developing an NNFL may benefit many users, including the material controls and accounting, safeguards, and treaty verification communities. Furthermore, nuclear forensics at its most practical level supports law enforcement agencies in the prosecution of individuals illegally in possession of nuclear and radiological materials.

Hot Cell Training in Tbilisi, Georgia

When the IAEA was looking for a way to educate inspectors on how to sample hot cells in nuclear facilities, they came to the NIS's Nuclear Noncompliance Verification (NNV) program to find a solution. One of NNV's missions is to assist the IAEA in developing tools and technologies to conduct inspections in critical facilities in countries of concern.

NNV, working with scientists at PNNL and the Andronikashvili Institute of Physics in Tibilisi, Georgia, designed a week-long course for hot cell and glovebox sampling in reprocessing facilities.

The Andronikashvili Institute of Physics has a Russian-built research reactor (IRT type) that was decommissioned in the early 1990's. The reactor has an associated radiochemical laboratory (hot cell facility) that was used briefly to separate only very short half-life materials. It is now totally free of radioactive material and is one of the only facilities in the world where students actually can climb into a hot cell to see how it really looks and operates.

NIS and PNNL initially taught the course in October 2010 and again in June 2011. The training consists of a mix of classroom lectures, tours, and realistic demonstrations and exercises in the hot cells and glovebox facilities. NIS plans to hold the course on an annual—or more frequent—basis.

Hot Cell Inspections

Hot cells are shielded nuclear radiation containment chambers. They are required to protect workers from radioactive isotopes by providing a safe containment box in which they can control and manipulate equipment, such as for non-weapons program research or the production of radiopharmaceuticals.

IAEA inspectors often are required to take environmental swipe samples in hot cell facilities to help them determine that no illicit nuclear activities have taken place there and to assist them in coming up with a complete understanding of the nuclear activities of a particular country. It is very difficult for inspection trainees to see exactly what the inside of a hot cell looks like. Most hot cells in the world are contaminated with long lived nuclear materials, making it extremely difficult to actually get inside. The only way to see into most hot cells is through a small lead glass window that requires inspectors to use mirrors to see the entire hot cell.

Monitoring HEU Processing

In FY 2012, the NIS Highly Enriched Uranium (HEU) Transparency Program reached 92 percent completion of the 1993 U.S.-Russia HEU Purchase Agreement's 500 metric ton (MT) goal. Over the past year, NIS monitored the conversion of an additional 30 MT of Russian HEU—roughly equivalent to 1,200 nuclear weapons—into low-enriched uranium (LEU). The cumulative total of HEU eliminated from the Russian stockpile is now 463 MT.

Throughout FY 2012, NIS completed 24 special monitoring visits, during which U.S. experts measured and observed Russian HEU processing firsthand; analyzed facility-provided accountability and shipping declarations; and retrieved data from continuous, unattended U.S. monitoring equipment. These transparency data allow the United States to confirm that the LEU delivered under the Agreement is derived from Russian weapons-origin HEU in furtherance of the Agreement's nonproliferation goals.

In September 2012, NIS completed Transparency Monitoring Office operations at the Ural Electrochemical Integrated Plant in Novouralsk, Russia, after 16 years of successful HEU-LEU monitoring there. The Program will continue to monitor HEU-to-LEU processes during six scheduled special monitoring visits in 2013.

Also in FY 2012, NNSA and Russian State Atomic Energy Corporation (Rosatom) experts negotiated the sequence of activities necessary to properly complete reciprocal transparency monitoring activities at U.S. and Russian nuclear material processing facilities. The two sides also continued their discussions on the disposition of installed U.S. monitoring equipment in Russian facilities.

HEU Transparency Program

The HEU Transparency Program within NIS provides confidence that 500 MT of HEU from Russian weapons (roughly equivalent to 20,000 nuclear weapons) is eliminated as part of the 1993 U.S.-Russia HEU Purchase Agreement. Program experts monitor the conversion of HEU into LEU in Russia to provide assurance that all LEU delivered under the Agreement is derived from Russian weapons-origin HEU. The LEU is purchased by the U.S. Executive Agent, the U.S. Enrichment Corporation (USEC), shipped to the United States, and fabricated into fuel for peaceful use in commercial nuclear power plants.

The Russian Federation also conducts reciprocal monitoring activities at U.S. facilities to confirm the peaceful use of all LEU delivered under the Agreement.

The Agreement will be completed fully in FY 2015 when all Russian weapons-origin LEU is manufactured into nuclear fuel and final accounting and transparency documents are formally provided to the Russian Federation State Atomic Energy Corporation, Rosatom. USEC and Techsnabexport (TENEX), the executive agents for the Agreement, manage the commercial aspects and logistics of all the uranium shipments and transfers.

Nearly half of all commercial nuclear energy produced in the United States comes from nuclear fuel derived from Russian nuclear weapons, and this fuel generates roughly 10 percent of all U.S. electricity consumed annually.

U.S. and UK Cooperate on a Warhead Monitored Dismantlement Exercise

With a formal "wrap-up" and lessons learned meeting in December 2011, the United States and the United Kingdom (UK) completed a significant 18-month Warhead Monitored Dismantlement Exercise under the 1958 U.S.-UK Mutual Defense Agreement. The exercise built on and added to the body of research and analysis that has been acquired through more than a decade of U.S.-UK cooperation on arms control and nonproliferation matters led by the NIS Office of Nuclear Verification.

The exercise scenario focused on two fictional countries with nuclear weapons negotiating an Agreement and Protocol with the basic provisions for mutual nuclear weapons reductions that would be accomplished through monitored dismantlement. The monitored dismantlement was performed in an operational nuclear facility and involved a representative nuclear device with fissile material and simulated high explosives.

Exercise planning began in July 2010 and exercise activities took place throughout 2011. Activities included monitoring regime scope discussions and the negotiation of a monitoring protocol, a familiarization visit, Joint Chain of Custody Working Group meetings, Joint Nondestructive Assay Methods Working Group meetings, and the November 2011 Monitoring Visit.

The aims and objectives of the exercise were to build on past cooperation and technology development and to develop a robust chain of custody as part of a realistic dismantlement scenario.

U.S.-UK activities such as the Warhead Monitored Dismantlement Exercise clearly demonstrate that exchanges improve the scientific and technological abilities to support existing and future arms control and nonproliferation initiatives, including the negotiation of new agreements. Lessons learned from U.S.-UK work show that countries can collaborate on sensitive technical disarmament and verification topics and can benefit from a well managed technical collaboration. The exercise demonstrated that implementing a warhead dismantlement regime requires resolution of many difficult classification, access, technology, and legal challenges, which require foresight, preparation, ingenuity, and resources to overcome. Participants saw first-hand that there are possibilities for creative approaches to support monitoring and verification, even in some of the most sensitive and challenging operational environments.

Monitor inspecting a video camera tamper-indicating enclosure during the Warhead Monitored Dismantlement Exercise.

PPRA Has Historic Anniversary in FY 2012

September 23, 2012, marked the 15th anniversary of the signing, and entry into force, of the *Agreement Between the Government of the United States of America and the Government of the Russian Federation Concerning Cooperation Regarding Plutonium Production Reactors*, more commonly referred to as the *U.S.-Russia Plutonium Production Reactor Agreement (PPRA)*. Under the PPRA, both countries agreed to measures that would assure that 27 plutonium production reactors shut down in both the United States and the Russian Federation would not resume operation. In addition, the Agreement also includes the shutdown of the last three operating Russian plutonium production reactors and provides for monitoring the plutonium oxide produced from the spent fuel of those reactors prior to shut down and to ensure that the plutonium is not used in weapons.

DOE is the U.S. Executive Agent for the PPRA, and within NNSA, the NIS is responsible for implementing the PPRA monitoring. Representatives from the NIS Office of Nuclear Verification's Warhead and Fissile Material Transparency (WFMT) Team were responsible for negotiating the Agreement, developing the monitoring regime, and successfully managing DOE's role in the PPRA program.

The WFMT Team provides policy direction, represents DOE at the U.S.-Russia PPRA Joint Implementation and Compliance Commission meetings, and implements the monitoring provisions of the Agreement. Annual reciprocal monitoring visits are conducted at shutdown U.S. and Russian plutonium production reactors, and twice a year U.S. monitors also visit Russian plutonium oxide storage facilities to monitor the status of the plutonium oxide subject to the PPRA. In June 2012, U.S. PPRA monitors traveled to Zheleznogorsk and Ozersk, Russia, to conduct the annual monitoring of the Russian shutdown reactors. In July 2012, Savannah River and Hanford Sites hosted a Russian monitoring team during their annual visit to the U.S. shutdown reactors in Aiken, South Carolina, and Richland, Washington. In addition, in October 2011 and March 2012, U.S. technical experts from the Savannah River Site and PNNL, as members of the U.S. PPRA monitoring team, traveled to Seversk and Zheleznogorsk to monitor the stored Russian plutonium oxide.

Fifteen years of successful PPRA implementation have resulted in the following:

- Eleven of the original 27 reactors that are shut down (six in the United States and five in Russia) have been determined to be irreversibly dismantled and have been removed from annual PPRA monitoring.
- Over nine MT of Russian plutonium oxide has been reprocessed and is now stored in Russia and regularly monitored by U.S. teams to ensure that it is not used in weapons.

PPRA participants for the United States include the WFMT Program; the Savannah River and Hanford Sites; technical experts from PNNL, LANL, and Lawrence Livermore National Laboratory (LLNL); the Defense Threat Reduction Agency; and the Department of State. Participants for the Russian Federation are from the Rosatom State Corporation, the Mining and Chemical Combine in Zheleznogorsk, the Siberian Chemical Combine in Seversk, and the Mayak Production Association in Ozersk.

During a July 2012 PPRA monitoring visit to the Savannah River Site's K Reactor, U.S. experts installed the first PPRA seal at a shutdown U.S. reactor in over a decade.

Leadership in Amending U.S. Regulations

In 2011, NIS led the process to amend the Department's regulation concerning unclassified assistance to foreign atomic energy activities. With the changes to nuclear commerce over the past twenty years, DOE concluded it was imperative to update Title 10 of the Code of Federal Regulations (CFR), Part 810—Assistance to Foreign Atomic Energy Activities—to reflect the way U.S. nuclear companies conduct business today and to facilitate U.S. conformity to Nuclear Suppliers Group Guidelines.

The public comment period ended in December 2011 and NIS is reviewing all comments. All revisions made to the Part 810 regulation are critical in enabling DOE to control the export of nuclear technologies and services while protecting the interest of, and advancing, U.S. nonproliferation and other national security objectives.

Proposed Rules

10 CFR Part 810

10 CFR Part 810 "empowers the Secretary of Energy to authorize U.S. persons to engage directly or indirectly in the production of special nuclear material outside the United States." In essence, "810 approvals" affirm that the recipient government pledges to use the acquired technology exclusively for peaceful purposes. The recipient government also ensures it will not re-transfer the acquired technology to another country without the consent of the supplier-country government.

The suggested revisions to the regulation update and clarify several provisions and identify the information applicants are required to submit in support of applications for an authorization under this Part. The revisions are intended to reduce uncertainties for industry users concerning which foreign nuclear-related activities by U.S. persons are "generally authorized" under the regulation and which activities require a "specific authorization" from the Secretary of Energy.

Nuclear Suppliers Group

Leadership of the Nuclear Suppliers Group (NSG), for which the United States assumed the Chairman's role in June, was an important nonproliferation and export control objective for the Administration. The twenty-second NSG Plenary Meeting occurred in Seattle on June 21–22 under the chairmanship of Deputy Secretary of Energy Daniel Poneman. Two hundred and thirty representatives attended from the NSG's 46 Participating Governments, plus the European Commission and the Zangger Committee. Working closely with the Department of State and the Nuclear Regulatory Commission, the NIS policy office played a key role in developing U.S. policy for the event. NIS also provided direction and funding to organize the Plenary, with logistical support by PNNL.

The NSG's goal is to prevent the proliferation of nuclear weapons through the implementation by Participating Governments of export control guidelines for nuclear and nuclear-related material, dual-use material, equipment, software, and technology. At the same time, the NSG seeks to avoid hindering international trade and cooperation in the peaceful uses of nuclear energy. Among other achievements at the Seattle meeting, the Group strengthened the NSG Guidelines related to nuclear materials for peaceful purposes, accelerated NSG outreach to engage industry and promote transparency, and exchanged best practices on export licensing and enforcement.

The participants also shared concerns about the proliferation implications of the North Korean and Iranian nuclear programs and called upon all countries to exercise vigilance to ensure that their nuclear exports do not contribute to nuclear weapons programs.

NIS provides critical policy and technical support for the NSG. Among other responsibilities, NIS provides ongoing support to facilitate information sharing within the NSG, technical expertise to the current NSG Chairman, and assistance to the incoming Chair for 2013. Work is under way to implement decisions from the Seattle Plenary, such as spreading awareness of the NSG's goals and objectives to governments and industry. The U.S. Chairman and team will also help prepare the Participating Government that will host the 2013 Plenary.

Pacific Northwest National Laboratory

The United States assumed the Chairmanship of the NSG in June 2012. The NIS policy office played a key role in the NSG meeting held that same month.

Global Partnership Working Group

Having successfully fulfilled its initial 10-year commitment, the 24 members of the G-8 Global Partnership (GP) Against the Spread of Weapons and Materials of Mass Destruction have decided to continue the effort, and NIS will continue to play an important role. The Global Partnership has identified four priorities as it moves ahead: nuclear and radiological security, biosecurity, scientist engagement, and facilitating implementation of United Nations Security Council Resolution (UNSCR) 1540. NIS is contributing to all but the biosecurity GP priority areas.

The GP, a working group within the G-8, began in 2002 as an initiative to prevent terrorists or States that support them from acquiring or developing weapons of mass destruction. The initial focus of the GP largely was on proliferation challenges associated with the former Soviet Union. NIS's Global Initiatives for Proliferation Prevention program from the beginning has played an important role in supporting GP activities, engaging with FSU scientists, technicians, and engineers with WMD, missile, and related expertise so they can use their skills for non-weapons related, commercially oriented purposes.

As the GP reached its 10-year conclusion, members recognized an opportunity to evolve its activities to reflect the changes in the threat of WMD terrorism and look at other parts of the world in addition to the FSU.

As Chair of the GP in 2012, the United States increased the number of meetings, prioritized the engagement of non-G-8 GP partners, including international organizations, and established strong ties to the UNSCR 1540 Committee. The GP also increased information gathering, and exchange of information among partners about ongoing and potential GP projects. NIS has played an important role in supporting the Chair this year, including the establishment of a rotation at the Department of State working directly for the Chair on critical GP issues of direct relevance to NNSA. NIS chaired a working group with the International Organizations (IOs) at each of the GP meetings, facilitating the integration of IOs into the GP framework, and worked closely with the IOs to help them present their ideas for collaboration with the GP. NIS staff also delivered presentations on a host of GP-related issues throughout the year, and established strong ties with the GP community as the NNSA representatives.

NIS also supported, and co-chaired, an independent "think tank" (the International Working Group [IWG]) that met prior to most GP meetings. The IWG provided a forum for GP members to discuss with IOs, industry, and academic colleagues, issues of relevance to the GP in a less constrained, intellectually stimulating environment. Among other issues, the IWG focused on 1540 implementation and scientist engagement—two issues of high importance for NIS.

In 2012, the GP established subworking groups (SWGs) to help advance work in key GP areas, including one on Centers of Excellence (CoEs). NIS played the primary role in supporting the CoE SWG, working closely with the UK Chair, making key presentations to the SWG, and helping to develop new ideas for "next steps" for the working group.

GP Membership

G-8 Countries

- Canada
- France
- Germany
- Italy
- Japan
- Russian Federation
- United Kingdom
- United States

Australia

Belgium

Czech Republic

Denmark

European Union

Finland

Ireland

Kazakhstan

Netherlands

New Zealand

Norway

Poland

Republic of Korea

Sweden

Switzerland

Ukraine

Reducing the Dangers of Nuclear Confrontation in South Asia

DAILY NEWS

India follows Pakistan with missile test

Two day after Pakistan announced its missile test, India test-fired its second-longest-range missile on Wednesday. In April India unveiled it 5,500-kilometers Agni V missile that brought the country to the door of a select club of nations with inter-continental ballistic missiles.

NIS and Sandia National Laboratories used a new virtual reality training tool (VRTT) for the first time in April and again in September 2012 in workshops focused on Transparent Missile Dismantlement in South Asia. The VRTT was deployed in conjunction with experts from Sandia, Lawrence Livermore, and Savannah River National Laboratories to simulate the design and execution of an inspection regime in South Asia.

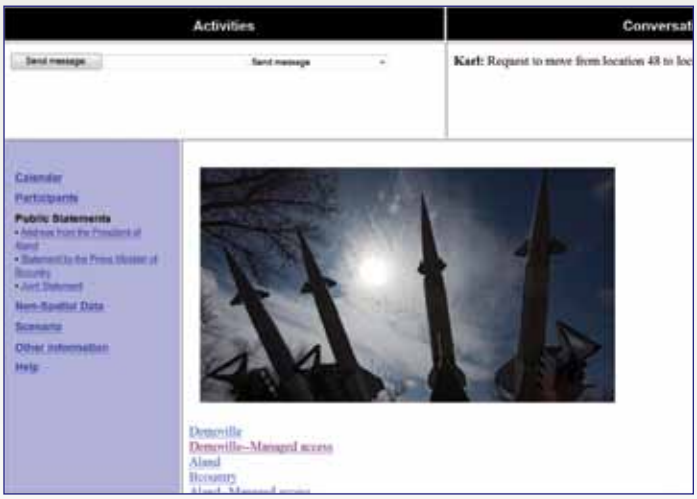
The workshop in April brought Pakistani academic, scientific, and military analysts to Colombo, Sri Lanka, to explore scenarios for the transparent process of dismantling obsolete nuclear-capable missiles either unilaterally or in parallel with India. The virtual reality tool played an invaluable role in letting participants gain confidence in inspections as a low risk confidence-building tool, and understand practical difficulties that would need to be overcome.

In September, the VRTT was used again in an analogous exercise in New Delhi with a diverse group of Indian security experts. Indian participants, too, found enormous value in the ability to model and then simulate the inspection and hosting aspects of an agreement. In so doing, analysts from both sides were able to simulate inspections that grew transparency while simultaneously protecting their own classified information.

This series of workshops is aimed at facilitating the ongoing NIS process of advancing the discussion of confidence-building measures such as missile elimination on the Subcontinent. The tool itself has the potential to evolve by moving from a training/exploration tool to being an integral part of an inspection process central to building confidence and growing trust between India and Pakistan.

Virtual Reality Training Tool

NIS and Sandia National Laboratories' Department of International Nuclear Threat Reduction developed the VRTT for use in reducing the risks from WMD. The new tool uses the latest commercial off-the-shelf technology to allow international security-focused training scenarios to be developed quickly and easily for a wide variety of situations.



Acronyms and Abbreviations

AG—Australia Group

AP—Additional Protocol

BWC or BTWC—The Convention on the Prohibition of the Development, Production, and Stockpiling of Bacteriological (Biological) and Toxin Weapons and their Destruction

CBM—Confidence-Building Measures

CFR–Code of Federal Regulations

CIT—Commodity Identification Training

CoE–Center of Excellence

CSA—Comprehensive Safeguards Agreement

DOE—U.S. Department of Energy

DNN–Office of Defense Nuclear Nonproliferation

E2C2—Export Enforcement Coordination Center

EU—European Union

EXBS—Export Control and Related Border Security

FSU—Former Soviet Union

GCEP—Gas Centrifuge Enrichment Plant

GICNT—Global Initiative to Combat Nuclear Terrorism

GIPP—Global Initiatives for Proliferation Prevention

GP— Global Partnership Against the Spread of Weapons and Materials of Mass Destruction

HEU—Highly Enriched Uranium

HEVA—Hybrid Enrichment Verification Array

IAEA—International Atomic Energy Agency

INECP—International Nonproliferation Export Control Program

INMD—Iraq National Monitoring Directorate

INS—International Nuclear Security

INSA—International Nuclear Security Academy

INSEP—International Nuclear Safeguards and Engagement Program

IO—International Organization

ISCN—Integrated Support Center for Nuclear Nonproliferation and Nuclear Security

ISTC—International Science and Technology Center

ITC—International Training Course

ITWG—International Technical Working Group

IWG—International Working Group

JAEA—Japan Atomic Energy Agency

KINAC—Korea Institute for Nuclear Nonproliferation and Control

LANL—Los Alamos National Laboratory

LEU—Low-Enriched Uranium

LLNL—Lawrence Livermore National Laboratory

MEXT—Ministry of Education, Culture, Sports, Science & Technology (Japan)

MT—Metric Ton

NGSI—Next Generation Safeguards Initiative

NIS—Office of Nonproliferation and International Security

NNFL—National Nuclear Forensics Library

NNSA—National Nuclear Security Administration

NNV—Nuclear Noncompliance Verification

NSG—Nuclear Suppliers Group

PNEM—Passive Neutron Enrichment Meter

PNNL—Pacific Northwest National Laboratory

PPRA—Plutonium Production Reactor Agreement

RevCon—Review Conference

Rosatom—Russian State Atomic Energy Corporation

SSAC—State System of Accounting for and Control of Nuclear Material

STCU—Science and Technology Center in Ukraine

SWG—Subworking Group

TENEX—Techsnabexport

TEWG—Technical Expert Working Group

UF_6—Uranium Hexafluoride

UK—United Kingdom

UNSCR—United Nations Security Council Resolution

U.S.—United States

USEC—U.S. Enrichment Corporation

VRTT—Virtual Reality Training Tool

WFMT—Warhead and Fissile Material Transparency

WMD—Weapons of Mass Destruction

United States Department of Energy
National Nuclear Security Administration
Defense Nuclear Nonproliferation
Office of Nonproliferation and International Security
1000 Independence Avenue, S.W.
Washington, D.C. 20585
www.nnsa.energy.gov/nonproliferation/nis