



Office of Defense Nuclear Nonproliferation



# Strengthening Nonproliferation and Arms Control

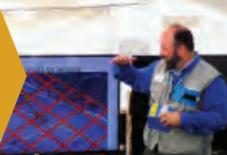
FY 2014 ANNUAL REPORT

OFFICE OF  
**NONPROLIFERATION AND  
ARMS CONTROL (NPAC)**

# Contents

## Acronyms

AADI	automated abstracting of digital images
AEFC	Advanced Experimental Fuel Counter
AG	Australia Group
CDS	Change Detection System
CFR	Code of Federal Regulations
CG	Consultative Group
CIT	Commodity Identification Training
CTBT	Comprehensive Nuclear-Test-Ban Treaty
DNN	Office of Defense Nuclear Nonproliferation
DOE/ NNSA	U.S. Department of Energy National Nuclear Security Administration
eCIT/ SCORE	eCIT Strategic Commodity Reference
FY	Fiscal Year
GIRM	Graphite Isotope Ratio Method
GMS	Office of Global Material Security
HEU	highly enriched uranium
hiRX	High Resolution X-Ray
IAEA	International Atomic Energy Agency
IDC	International Data Centre
IFE14	Integrated Field Exercise 2014
iSFRC	Improved Spent Fuel Rod Counter
LAARS	laser ablation absorbance ratio spectrometry
LEU	low enriched uranium
M <sup>3</sup>	Office of Material Management and Minimization
MPC&A	Material Protection, Control and Accounting
MT	metric ton
MTCR	Missile Technology Control Regime
NDA	non-destructive assay
NGSI	Next Generation Safeguards Initiative
NIS	Office of Nonproliferation and International Security
NPAC	Office of Nonproliferation and Arms Control
NP/AC	nonproliferation and arms control
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSG	Nuclear Suppliers Group
OLEM	online enrichment monitor
OSI	on-site inspection
OTH	Over the Horizon
R&D	Office of DNN Research and Development
RevCon	Review Conference
RSTT	Regional Seismic Travel Time
TEG	Technical Experts Group
TRI-ACE	Tamper Resistant/Indicating Aerosol Contaminant Extractor
UCVS	unattended cylinder verification station
UF <sub>6</sub>	uranium hexafluoride
UK	United Kingdom
UNSCR	United Nations Security Council Resolutions
UV-vis	ultraviolet-visible light
U.S.	United States
USSP	U.S. Support Program
WMD	weapons of mass destruction

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“TWELVE COUNTRIES AND TWO DOZEN NUCLEAR FACILITIES AROUND THE WORLD HAVE NOW RID THEMSELVES ENTIRELY OF HIGHLY ENRICHED URANIUM AND PLUTONIUM. DOZENS OF NATIONS HAVE BOOSTED SECURITY AT THEIR NUCLEAR STORAGE SITES, OR BUILT THEIR OWN COUNTER-SMUGGLING TEAMS, OR CREATED NEW CENTERS TO IMPROVE NUCLEAR SECURITY AND TRAINING. THE INTERNATIONAL ATOMIC ENERGY AGENCY, OR THE IAEA, IS NOW STRONGER AND MORE COUNTRIES HAVE RATIFIED THE TREATIES AND INTERNATIONAL PARTNERSHIPS AT THE HEART OF OUR EFFORTS.”

President Obama, Presentation of The Hague Nuclear Summit Communiqué, March 25, 2014

THE **NEW** OFFICE OF NONPROLIFERATION AND ARMS CONTROL

# Mission:

Prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions

### Challenges across DNN:

- Detect/deter undeclared nuclear materials and activities
- Detect/deter illicit transfers of nuclear/dual-use materials, technology, and commodities
- Reduce nuclear weapons
- Address evolving threats/challenges to NP/AC regimes



### NPAC Contributions:

- Build capacity of the IAEA and Member States to implement and meet safeguards obligations
- Build domestic and international capacity to implement and meet export control obligations
- Develop and implement regimes to reduce nuclear weapons and detect and dismantle undeclared nuclear programs
- Develop programs and strategies to address emerging NP/AC challenges and opportunities

# Strengthening Nonproliferation and Arms Control

FY 2014 was a year of strategic review and planning for the U.S. Department of Energy National Nuclear Security Administration (DOE/NNSA) Office of Defense Nuclear Nonproliferation (DNN). Within that context, DNN's Office of Nonproliferation and International Security (NIS) undertook a strategic review of its entire organization, as well as reviews of the NIS export control activities and the NIS Next Generation Safeguards Initiative (NGSI) activities. As part of its strategic review, NIS assessed its mission, core competencies, and goals and objectives.

Much of the strategic thinking we did within NIS proved timely and beneficial for DNN's strategic review. The result of all of these efforts helped shape the realignment of DNN along functional lines to create a flexible and responsive organization prepared to address both enduring and evolving threats to nuclear security. The new DNN organization will consist of four main offices: Office of Global Material Security (GMS); Office of Nonproliferation and Arms Control (NPAC); Office of Material Management and Minimization (M<sup>3</sup>); and Office of DNN Research and Development (R&D).

Effective January 1, 2015, as part of DNN's realignment, NIS became NPAC. The graphic on the facing page encapsulates the new NPAC organization under the DNN realignment. NPAC will focus on its core competencies of nuclear safeguards, nuclear export controls, nuclear verification, and nuclear nonproliferation policy. NPAC will work to strengthen the nonproliferation and arms control regimes by implementing a comprehensive and integrated set of initiatives and activities that are designed to: (1) build capacity of the International Atomic Energy Agency (IAEA) and Member

States to implement and meet safeguards obligations; (2) build domestic and international capacity to implement and meet export control obligations; (3) develop and implement verification regimes to reduce nuclear weapons and detect and dismantle undeclared nuclear programs; and (4) develop programs and strategies to address emerging nonproliferation and arms control challenges and opportunities. The nuclear security-related efforts that previously resided in NIS have been moved to GMS and will not be part of the new NPAC organization.

I invite you to look at this report summarizing the achievements of our last year as NIS. The report describes our other strategic planning efforts in the areas of export controls and NGSI. It also highlights how we help DOE/NNSA fulfill its export control mandates and support the international community dedicated to nonproliferation. See where we have reached thousands of officials through training and engagement in just one year. Look back with us at the successful completion of the major milestones of the historic 20-year U.S.-Russia Highly Enriched Uranium (HEU) Purchase Agreement. Review the technologies and techniques we are helping to transition to the field to meet near-term nuclear safeguards, export control, and verification needs. Finally, take a look at some ways we began—as NIS—and will continue—as NPAC—to help shape the future in nonproliferation and arms control.

FY 2014 was a great final year for NIS. Now that we are NPAC, I look forward to continuing our nonproliferation work with all our domestic and international partners in FY 2015 and beyond.

**Kasia R. Mendelsohn**  
 Assistant Deputy Administrator  
 DOE/NNSA Office of Nonproliferation and Arms Control



# Addressing Complex Threats

# Thinking Strategically

## NUCLEAR THREATS ARE ENDURING AND EVOLVING.

- The potential for state-based proliferation, particularly in unstable political regions, remains a concern.
- Terrorist attempts to acquire weapons of mass destruction (WMD) continue and bad actors are becoming more sophisticated.
- More countries are building civilian nuclear energy programs but may lack the ability to safeguard their nuclear materials and facilities.
- The pace of technological advances is accelerating, which challenges multilateral export lists to keep pace.
- Despite progress, some critical nuclear and radiological assets still are undersecured, and sophisticated illicit supply networks represent an ongoing threat.

The threats the nonproliferation regime faces are both enduring and evolving. NIS/NPAC works as part of the DNN team to strengthen the nonproliferation and arms control regimes. We apply our unique technical and policy expertise to prevent proliferation, ensure peaceful nuclear uses, and enable verifiable nuclear reductions.

In FY 2014, the NIS organization focused on four primary areas:



**Nuclear Safeguards and Security:** Safeguarding and securing nuclear material and facilities to prevent diversion, theft, and sabotage.



**Nuclear Controls:** Facilitating legitimate nuclear cooperation by strengthening domestic and global capacity to control the illicit transfer of WMD dual-use material, equipment, technology, and expertise.



**Nuclear Verification:** Developing policy and technical solutions for transparent nuclear reductions and treaty monitoring and compliance.



**Nonproliferation Policy:** Developing cross-cutting policy and technical solutions and programs and strategies to reduce nuclear dangers.

In FY 2014, NIS completed three internal strategic reviews to position the organization to meet current and future nuclear nonproliferation challenges. NPAC is using the results of these reviews to shape the direction of its strategic plan currently being developed for FY 2016–2020.

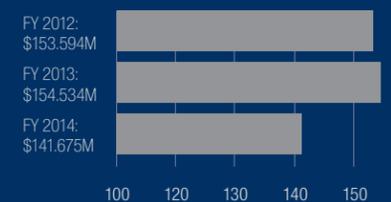
**NIS Strategic Review:** In 2010, NIS conducted an “Over the Horizon” (OTH) opportunity analysis study to examine mid-term threats and challenges to the nonproliferation regime. Building on the OTH, in FY 2014, NIS conducted a comprehensive review of its mission, core competencies, and organizational structure. Overall, as a result of the review, NIS concluded that while its four primary capability areas (safeguards, export controls, verification, and nonproliferation policy) remain fundamental to how the United States responds to emerging nonproliferation challenges, making certain organizational adjustments would improve internal NIS functionality and flexibility. The NIS strategic review provided significant contributions to DNN’s realignment efforts and will support the NNSA strategic plan being prepared in FY 2015. In the new fiscal year, NIS has modified its name to Nonproliferation and Arms Control (NPAC) and will document the results of its reviews into a five-year NPAC strategic plan synchronized with DNN and NNSA strategies and plans.

**NGSI Strategic Review:** NNSA launched the Next Generation Safeguards Initiative (NGSI) in 2008 to develop the policies, concepts, technologies, expertise, and international safeguards infrastructure necessary to strengthen and sustain the international safeguards system. In FY 2014, NIS undertook a review of NGSI’s vision, mission, goals, and objectives to assess the initiative’s overall organizational health and strategic direction five years into implementation. This effort evaluated three main areas: (1) project execution;

(2) subprogram structure and design; and (3) NGSI strategic design. The study concluded that NGSI’s design, operational structure, and implementing teams were sound, but that additional steps could be taken to enhance the initiative’s strategic planning, stakeholder outreach, and project monitoring and evaluation activities. The results of the review helped to inform decisions supporting NGSI’s FY 2015 and out-year budget formulations and program execution plans.

**NIS Export Control Review:** NIS conducted an in-depth strategic review of all of its export control-related activities to ensure a holistic and coordinated approach to the policy and implementation elements of its export control activities. Going into the review, NIS recognized that it needed: (1) greater policy integration across implementation functions and activities; (2) increased day-to-day coordination and communication among the activities; (3) increased leveraging of National Laboratory assets and resources; (4) a consolidated approach for the development of information technology systems; (5) and consistent strategic messaging. To address these issues, the export control review involved developing consensus mission and threat statements as well as a consensus set of “core competencies” and a programmatic “binning” tool that provide the basis for coordinating engagement strategies relative to strategic priorities.

NIS Funding History



The decrease in NIS funding from FY 2013 to FY 2014 is due, in large part, to the completion of requirements under the 1993 U.S.-Russia HEU Purchase Agreement (see page 10).



# Supporting Regulatory Requirements

DOE has specific responsibilities in the U.S. Government's review of export license applications to ensure that controlled items are not inappropriately approved for export. These reviews help the U.S. Government better understand both the intended recipient of an export and how the item may be misused if diverted.

## Summary of NIS Support of Regulatory Requirements in FY 2014

Statute	Regulatory Requirement	Exports Regulated	NIS/NPAC Role	NIS FY 2014 Activities
Atomic Energy Act	10 CFR §810	Nuclear technology and technical assistance	Lead	Issued decisions on 10 cases and continued rulemaking process to update the regulations
Atomic Energy Act	10 CFR §110	Nuclear equipment and material	Support U.S. Nuclear Regulatory Commission	Reviewed 40 cases
Export Administration Act	15 CFR §7 (Export Administration Regulations)	Dual-use items	Support U.S. Department of Commerce	Reviewed ~5600 cases

NIS/NPAC also supports the U.S. Department of State in its review of munitions items under the International Traffic in Arms Regulations.

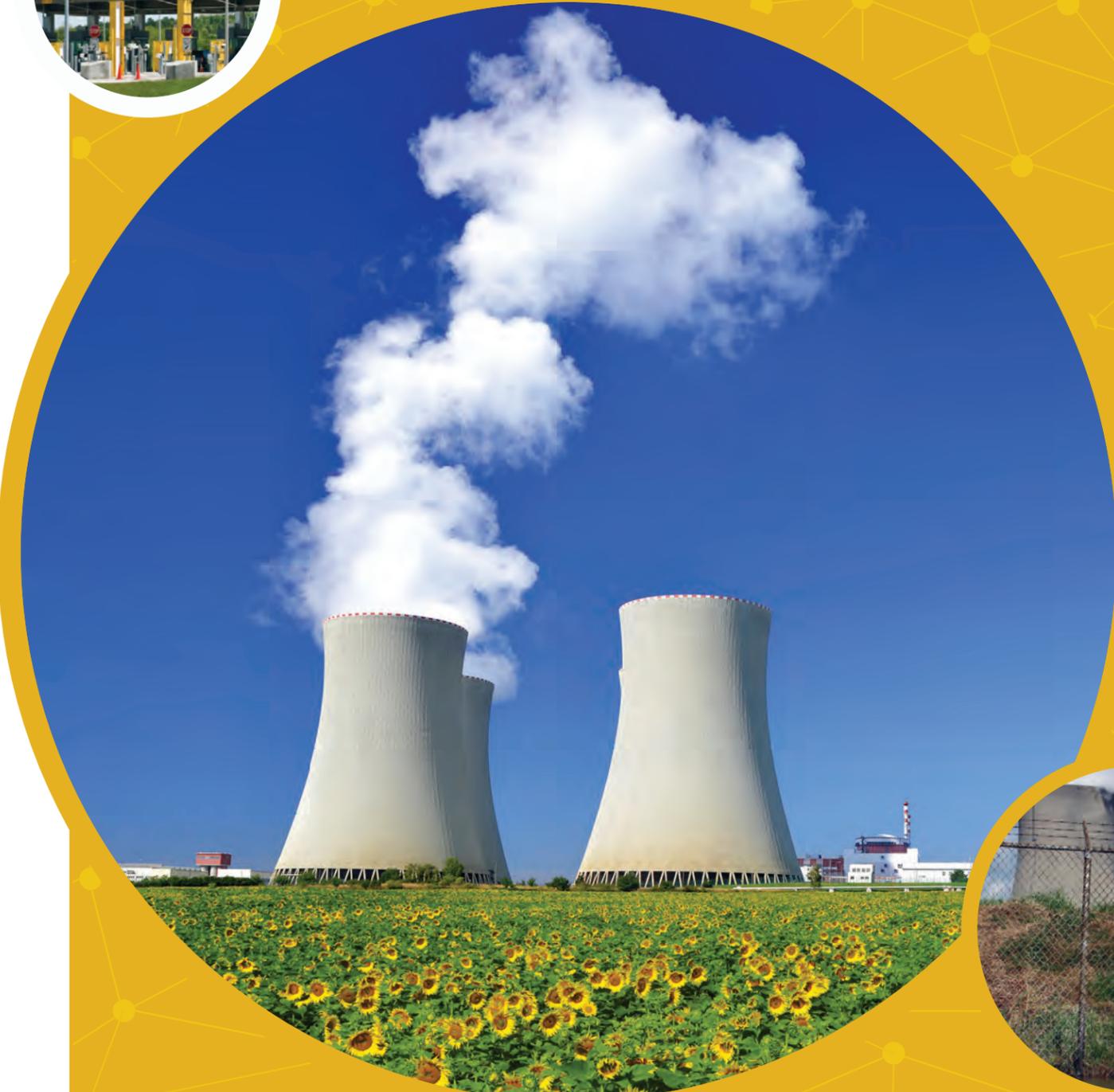
## End-to-End Technical Reviews

Because of their unique expertise, NIS/NPAC staff fulfill many of DOE's export control obligations with regard to the Atomic Energy and Export Administration Acts, providing end-user and technical reviews before a license is granted.



## Physical Protection Visits

The Atomic Energy Act and NRC Regulations (10 CFR §110.44) mandate that the U.S. Government ensures that all U.S. nuclear material exported to foreign countries for peaceful purposes remains fully protected. To be sure that the United States is meeting its legal requirement, NIS/NPAC conducts bilateral physical protection assessment visits to foreign facilities that hold U.S.-obligated nuclear material. NIS/NPAC also conducts visits to facilities to which the United States plans to provide nuclear material. During FY 2014, NIS conducted six bilateral physical protection assessment visits.



# Fulfilling International Obligations

The United States is committed to promoting international cooperation in nonproliferation activities through the IAEA and various multilateral supplier regimes. With its unique mix of technical and policy capabilities, NIS/NPAC is part of the DOE/NNSA and DNN teams that support U.S. participation in the IAEA. We also provide ongoing technical support of U.S. interagency delegations to the Australia Group (AG), Nuclear Suppliers Group (NSG), and the Missile Technology Control Regime (MTCR).

## IAEA: STRENGTHENING SAFEGUARDS FOR RESEARCH REACTORS

Each year, NIS/NPAC is among the DNN staff that support numerous cooperative activities with the IAEA. For example, the NIS/NPAC Next Generation Safeguards Initiative (NGSI) is contributing to a joint study entitled *Strengthening IAEA Safeguards for Research Reactors*.

The study is an outcome of a workshop held in Grenoble, France, in December 2013 on ways to improve IAEA safeguards for research reactors. The workshop was attended by safeguards experts from the United States, France, the United Kingdom (UK), the IAEA, and EURATOM. During the workshop, the United States, France, and the UK expressed concerns about the unique proliferation risks associated with research reactors and agreed to initiate the joint study.

By their design and routine, legitimate-usage research reactors can be operated in a highly variable manner, making IAEA monitoring of declared operations difficult. In their joint study, NGSI and its partners examined the history of safeguarding declared research reactors and laid out a series of recommendations for technical measures that could be implemented to enhance the IAEA's ability to detect and deter misuse. This study will serve as the basis for continued P-3 (U.S.-UK-French) collaborations to strengthen safeguards at the facility level.



## Australia Group: Developing a New Resource

NIS/NPAC plays a pivotal role in the U.S. Delegation to the AG, providing invaluable chemical and biological expertise to inform decision-making on Chemical and Biological Weapons-related export controls. The AG is an informal forum of countries which, through the harmonization of export controls, seeks to ensure that exports do not contribute to the development of chemical or biological weapons.

At the AG's intersessional meeting in November 2013, NIS representatives gave several well-received presentations on emerging dual-use technologies and played a critical role in successfully concluding a long-running U.S. effort to adopt the most comprehensive update to the AG's controls on corrosion-resistant valves in a decade. At the Annual AG Plenary in June 2014, NIS representatives presented the *Australia Group Common Control List Handbook*, a resource developed over a two-year period (FY 2013-2014). The two-volume handbook provides information on the appearance, key features, uses, and global producers of each item on each of the AG's five control lists, serving as a vital reference for personnel engaged in chemical and biological export controls—from front-line enforcement officials and license analysts to technology holders and technical experts supporting their national systems.

The AG unanimously accepted the handbook and has added it to their internal and public websites.



## Nuclear Suppliers Group: Providing Technical Expertise

The NSG seeks to contribute to nonproliferation through high standards for transfers of nuclear and dual-use technology, components, and materials. The continued success of the NSG depends on the Group's ability to ensure that the Trigger and Dual-Use Lists keep pace with technology, market trends, and security challenges. NIS/NPAC supports two sub-groups of the NSG: the policy body, known as the Consultative Group (CG), and the relatively new Technical Experts Group (TEG), which met again in June 2014.

At the 2010 Christchurch Plenary, the NSG recognized the need to conduct a comprehensive view of its control lists and initiated a three-year technical review to do just that. The so-called Fundamental Review came to a close at the 2013 Prague Plenary, where participating governments adopted 54 amendments to the Trigger and Dual-Use Lists across seven thematic areas—reactors, isotope separation, reprocessing, conversion and fuel fabrication, weaponization, industrial equipment, and miscellaneous. Given the success of the Fundamental Review and recognizing the value of refocusing the Group towards its technical roots, the 2013 Prague Plenary instituted the TEG as a standing group to continue such technical reviews so that the Trigger and Dual-Use Lists remain up-to-date and effective.

## Missile Technology Control Regime

The MTCR is an informal and voluntary association of countries that seeks to coordinate national export licensing efforts aimed at preventing proliferation of unmanned delivery systems capable of delivering WMD. NIS/NPAC is a major contributor to U.S. participation in MTCR meetings by engaging in discussions; presenting white papers, information papers, and proposals; and providing technical representatives and support to the U.S. MTCR delegations.

# Building Capacity

**4339**  
people trained in NIS courses or by NIS trainers

**158**  
training courses and workshops

**120**  
countries represented at training courses

**54**  
countries where training courses and workshops were held

**10**  
international and regional organizations represented at training courses

"... great way for those of us from the criminal side of export enforcement to see the bigger picture and to understand the potential impact of not stopping the export of certain tech items."

"Thank you again for what proved to be a very challenging, stimulating and helpful program, delivered with consummate professionalism and good humour."

"... this workshop will go a long way in helping us in our job."

"The tools I acquired in the identification of potentially risky commodities ... have been essential on an everyday basis."

"Having the opportunity for the first time to operate equipment gave encouragement and confidence to attend and learn more for my country."

"The government of Kenya is grateful to the U.S. Government for the support it offers through the CIT [Commodity Identification Training] course. ... The training has continued to make a positive impact on Kenya's security."

## NIS/NPAC courses and trainers help the United States and other countries build their capacity to

 Ensure nuclear material is used only for peaceful purposes (Safeguards Training)

 Prevent the illegal transfer of commodities and related know-how that could be used in weapons of mass destruction (Export Control Training)

 Detect undeclared nuclear activity (Nuclear Verification Training)

It is in the interest of the United States to help other countries meet their international obligations because when all countries adhere to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), United Nations Security Council Resolutions (UNSCR), and other agreements, all countries benefit.

## NIS/NPAC TRAINS

- government officials,
- policy makers,
- facility staff,
- regulatory staff,
- enforcement officials,
- business owners,
- and offers train-the-trainer opportunities.

 Countries of origin for training participants  
 Type of training (may have been more than one course)

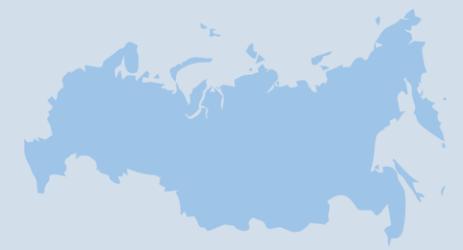


# Completing a Mission

In FY 2014, NIS completed all major milestones of the 1993 U.S.-Russia HEU Purchase Agreement, commonly known as the Megatons to Megawatts Program. Under the 20-year Agreement, NIS monitored downblending of over 500 metric tons (MT) of Russian weapons-origin HEU (the equivalent of approximately 20,000 dismantled nuclear warheads) into low enriched uranium (LEU) to ensure that all LEU delivered to the United States under the Agreement was derived from Russian weapons HEU and that all of the Agreement's nonproliferation objectives were fulfilled.

Megatons to Megawatts, 1993 - 2013

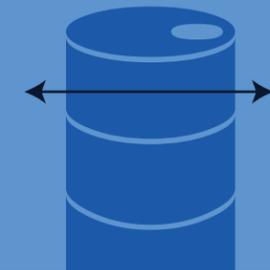
Russia downblended HEU from roughly 20,000 dismantled nuclear warheads.



500 MT of weapons-origin HEU went through the conversion process to LEU.



U.S. monitors made over 41,000 non-destructive assay measurements during the life of the HEU Program.



In October 2013, NIS completed its final monitoring activities in Russian facilities. The United States conducted 385 monitoring visits between 1993 and 2013.



The final 40 cylinders of LEU left Russia in November 2013 and arrived at the Port of Baltimore in Maryland in December 2013.



Russian weapons-derived LEU generated approximately 10 percent of U.S. electricity consumed over the past 15 years and will continue to contribute to U.S. electricity production for the next five years.



# Developing Fieldable Technologies

NIS/NPAC advances promising technologies and techniques with practical applications to improve implementing IAEA safeguards at the facility and state levels, manage export controls, and verify critical noncompliance issues. The goal of NIS/NPAC technology development and application activities is to transition tools and methods from the laboratory into the field by investing in innovations most likely to yield high impact results in the near-term. Our focus on fieldability builds on essential research and development conducted by the Office of Defense Nuclear Nonproliferation Research and Development to advance novel technologies at earlier levels of technology readiness, and provides a bridge between cutting-edge research and end users across different communities.

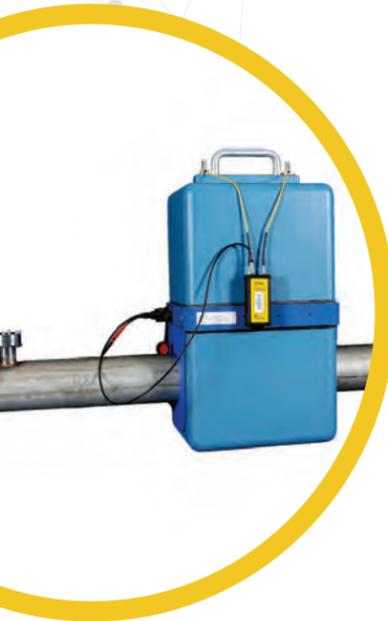
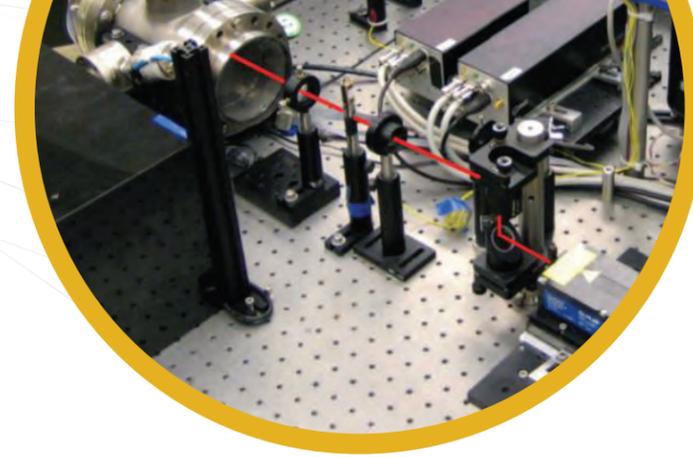
An example of a new technology NIS/NPAC is developing that could enhance the IAEA's flexible toolbox of technologies is an online enrichment monitor (OLEM). Under the auspices of the U.S. Support Program (USSP) to the IAEA's Department of Safeguards, DOE/NNSA has developed the OLEM to provide a real-time enrichment measurement of uranium hexafluoride (UF<sub>6</sub>) gas flowing through process pipes in uranium enrichment plants. The OLEM could enhance the IAEA's effectiveness in detecting the production of UF<sub>6</sub> at higher than declared enrichment levels.

The OLEM design combines gamma-ray spectrometry with gas pressure and temperature data to calculate relative enrichment as a function of time. In contrast to other enrichment monitoring approaches, the OLEM is a completely passive device and requires no external radiation sources for calibration or for gas-density correction. If operated in unattended mode, the OLEM has the potential to reduce the need for routine interim inspections and significantly diminish the need for drawing samples from gas and cylinders during inspections—thereby achieving operational and inspection efficiencies.

The development of OLEM, like most NIS/NPAC technology endeavors, involves collaboration with the U.S. National Laboratories.

## To improve export control capabilities, NIS/NPAC is:

Improving the user interface of the eCIT Strategic Commodity Reference (eCIT/SCORE), the searchable, online repository of Commodity Identification Training (CIT) materials that is designed so that foreign partners can easily adopt and customize it to complement their own CIT programs. Also added tools to enable NIS/NPAC to manage export control training materials more efficiently.



## FY 2014 ACTIVITIES

NIS supported the following technologies, tools, and methods during FY 2014.

Technologies marked with a ♦ denote those that received funding from or were initially developed by DNN's Office of Research and Development and transferred to NIS/NPAC to complete development and delivery to the customer.

## To improve safeguards capabilities, NIS/NPAC is:

Developing OLEM as described on page 12.

♦ Developing and testing spent fuel non-destructive assay (NDA) technologies to better detect fuel pin diversion, quantify the plutonium in fuel assemblies, and verify facility declarations.

Testing a High Resolution X-Ray (hiRX) technology that could be used for rapid, direct, and accurate quantitative analysis of plutonium in reprocessing facilities.

Developing a single chip shift register that could incorporate shift register circuitry into a neutron detector head to provide a simpler and less expensive data acquisition device for the IAEA and/or other foreign partners.

Validating and demonstrating a surveillance verification tool known as automated abstracting of digital images (AADI) that utilizes anomaly detection-based software to monitor processes, such as movement of spent fuel assemblies and mixed-oxide canisters, and could facilitate inspector surveillance reviews.

Developing a laser ablation absorbance ratio spectrometry (LAARS) technique that could be used for persistent environmental sampling and also for in-field destructive assay measurements on UF<sub>6</sub> samples.

♦ Optimizing a Tamper Resistant/Indicating Aerosol Contaminant Extractor (TRI-ACE) that could provide unattended continuous collection of air samples in a facility.

Testing and improving an ultraviolet-visible light (UV-vis) spectrometric system to provide real-time process monitoring in reprocessing facilities by accounting for solution impurities, thus simultaneously aiding the facility operator and providing a potential new tool for IAEA inspectors.

Developing and assessing the technical viability of an unattended cylinder verification station (UCVS) capable of performing routine UF<sub>6</sub> cylinder verification measurements using NDA techniques that could provide greater measurement accuracy on a full volume assay of the contents than current methods.

Building new electronic packages with improved performance (high count rate) for neutron coincidence counting and immunity to high-radiation environmental effects. These packages could replace the current decades-old practice of using preamplifier/discriminators in neutron proportional counters used by the IAEA for nuclear materials accountancy.

♦ Developing and evaluating the viability of near-term alternatives to Helium-3-based neutron detection techniques.

## To improve verification capabilities, NIS/NPAC is:

Enhancing the Change Detection System (CDS) for faster seal reading and image comparisons.

Developing a certifiable, authenticatable radiation portal monitor for detecting plutonium in nuclear facilities as part of a chain of custody regime.

Further developing a Tamper Indicating Enclosure for housing and storage of monitoring equipment.

Developing a Red Box for monitoring system data authentication.

Developing an improved loop seal—the Hydra Seal—and associated monitoring-related technologies.

♦ Providing expert advice to the International Data Centre (IDC) on installation and integration of the Regional Seismic Travel Time (RSTT) software and models with the Comprehensive Nuclear-Test-Ban Treaty Organization system, the design and interpretation of validation tests, and international outreach to extend models of regional seismic travel time to additional geographical regions for better location of seismic events.

♦ Supporting documentation, training and deployment of the Noble Gas Smart Sampler for collection of underground noble gas during a Comprehensive Nuclear-Test-Ban Treaty on-site inspection.

♦ Maintaining readiness with the Graphite Isotope Ratio Method (GIRM) capability that is used to determine the nuclear archaeology of a graphite moderated reactor. It includes a tool to sample graphite reactors, a trained team to take the samples, six laboratories (including two in the UK funded by the UK Government) to analyze the samples, and a steering committee to oversee the process.

Taking the Advanced Experimental Fuel Counter (AEFC) to Uzbekistan to measure spent fuel from their research reactor and training two people from the IAEA on how to operate the equipment.

Preparing the Improved Spent Fuel Rod Counter (iSFRC), which measures spent fuel being discharged from a graphite reactor, for potential deployment.

Improving the Uranium Sourcing technology that enables the U.S. Government to identify the origin of unknown uranium ore concentrate with high confidence.

# Helping to Shape the Future

In addition to all NIS/NPAC does to meet the challenges of today, the organization also invests in activities that will help shape the future. Preparing to verify compliance with new treaties, providing technical expertise to the interagency, and engaging the leaders of tomorrow are all in a day's work for the DNN team, including NIS/NPAC.

## CTBT READINESS

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) bans all nuclear explosions. Essential aspects of verifying treaty compliance include the ability to monitor for signs of nuclear explosions and development of a robust on-site inspection (OSI) capability.

NIS, working with experts at the U.S. National Laboratories, played a major role in advancing CTBT OSI readiness by helping to prepare for the Integrated Field Exercise 2014 (IFE14), a large-scale field exercise held early in FY 2015 in Jordan. NIS's support for IFE14 included planning events and providing training; loaning OSI-related equipment; and supporting key U.S. members of the Inspection Team, Inspected States Party, Control Team, and Evaluation Team. NIS support was key to the successful conduct of IFE14, and IFE14 results will play a major role in future CTBT OSI planning.



## 2015 NPT REVIEW CONFERENCE

Since entering into force in 1970, the NPT has been the cornerstone of the nonproliferation regime. The key articles of the Treaty and its three pillars supporting nonproliferation, disarmament, and the peaceful uses of nuclear technology are clearly evident throughout the core competencies of NIS/NPAC. With the next NPT Review Conference (RevCon) to discuss operation of the Treaty scheduled for 2015, NPAC's technical and policy expertise in the areas of nuclear safeguards, arms control, and export controls will bring credibility, defensibility, and strength to the U.S. Government's positions and negotiating strategy. NPAC staff will participate on the U.S. delegation in New York and support interagency activities back in Washington, D.C.

## INDIA/PAKISTAN

NIS has a long history of sponsoring opportunities for nuclear experts from India and Pakistan to envision crisis management frameworks for the Subcontinent. While engaging seasoned long-time nuclear specialists from the region remains critical, it is equally important to reach out to South Asia's rising generation of nuclear analysts. Fostering an eager and talented group of Indian and Pakistani strategic analysts is an investment in South Asia's future nuclear stability.

In that vein, NIS, teaming with Sandia National Laboratories, Lawrence Livermore National Laboratory, and other partners conceived the Colombo Confidence Building Process, in which young Indian and Pakistani strategic analysts worked together on a confidence-building exercise to eliminate an entire class of retired short-range ballistic missiles. The NIS team created a video of the exercise that has been used in Indian and Pakistani universities and posted online to expand the reach of the valuable engagement. The video, available at <http://southasianvoices.org/the-colombo-confidence-building-process-new-missile-cbms-for-south-asia/>, had more than one million unique viewings during FY 2014, and the project has served as a first-ever demonstration of the enormous power of social media applied to this kind of engagement in South Asia.



Unique views of video on social media surged past 2 million in FY 2014.



**United States Department of Energy**  
**National Nuclear Security Administration**  
**Defense Nuclear Nonproliferation**  
**Office of Nonproliferation and Arms Control**  
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