U.S. DEPARTMENT OF ENERGY (DOE)
NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)
DEFENSE NUCLEAR NONPROLIFERATION (DNN)

DNN Sentinel

DEFENSE BY OTHER MEANS

Vol. II, No. 2

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From the Deputy Administrator

The fourth Nuclear Security Summit—the last in the current format—is behind us, but the DNN work that made President Obama's Summit series such a success proceeds apace. DNN's core activities all began long before the Summits and remain central to implementing U.S. commitments. Because the Summits significantly expanded the international community engaged in nuclear security and accelerated the pace of work, DNN's universe of opportunities to work with partners globally to achieve our shared goal of permanent threat reduction has expanded significantly. DNN's active engagement with relevant international organizations serves as a multiplier in these efforts and enables us to build on the progress made. The newly-formed Nuclear Security Contact Group will serve as a focal point for those countries that choose to continue the process of meeting at least annually at senior levels to discuss how they are sustaining and expanding their nuclear security commitments. https://nnsa.energy.gov/blog/nnsa-keeps-promises-borne-out-nuclear-security-summit

We have highlighted in Congressional testimony and elsewhere the value of the political energy that the Summit series generated and nowhere was that more evident than in securing entry-into-force of the amended Convention on the Physical Protection of Nuclear Material and Facilities (CPPNMF). This Convention redefines international standards for the security of nuclear facilities, including insider threats and sabotage, and protection of nuclear materials in use, storage, and transit. Ensuring implementation of the CPPNMF will be an important next step in our global nuclear security engagement. Another vehicle that will enable DNN to advance the nuclear security agenda is the growing network of centers of excellence (COEs). COEs serve as centralized locations where a country or region can send professionals for training in various aspects of nuclear security. These centers broadly advance the global nuclear security agenda by addressing the need for capacity building, technology development, and coordination of assistance. DNN programs make

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http://nnsa.energy.gov/aboutus/ourprograms/nonproliferation-0

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NNSA BLOG

Letter from the Deputy Administrator – *Continued*

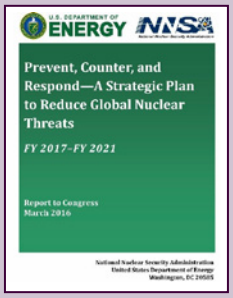
important contributions to all of these efforts. https://nnsa.energy.gov/mediaroom/factsheets/coe

New tools like the Contact Group, the amended CPPNMF, and COEs will be invaluable as DNN works with its partners to counter a formidable array of emerging threats and challenges, including technological developments such as additive manufacturing, unmanned aerial vehicles, and cyber attacks. Other threats and challenges relate to political and economic developments like the global expansion of nuclear power, increased opportunities for illicit nuclear material trafficking due to expanding global trade volumes, and eroded control within weak or failing states.

While we celebrate our Summit successes, DNN remains focused on the future. The leadership, technical expertise, and creativity found within the team that stretches from headquarters across the entire DOE technical complex will continue to be called upon to respond to emerging threats and to seize new opportunities.

Anne Harrington
Deputy Administrator
Defense Nuclear Nonproliferation

NNSA Releases New NPCR



NNSA released the second edition of *Prevent, Counter, and Respond—A Strategic Plan to Reduce Global Nuclear Threats (FY 2017–FY 2021)* on April 1, an update to the FY 2016 edition of the report. Also referred to as the "FY 2017 NPCR," the report summarizes significant developments within NNSA's nuclear threat reduction mission and details the restructuring and integration of the programs responsible for preventing, countering, and responding to nuclear threats. Foremost among developments since last year's inaugural report is the Joint Comprehensive Plan of Action (also known as the "Iran deal"), which blocks Iran's pathways to a nuclear weapon, rolls back its nuclear infrastructure and nuclear material stockpile, and grants international inspectors unprecedented access to nuclear-related facilities and sites in Iran. The FY 2017 NPCR also highlights the implications to NNSA's nuclear threat reduction programs from the emergence of new terrorist threats in Western Europe and the United States, as well as the Administration's FY 2017 proposal to pursue the "dilution and disposal" approach for disposing of excess weapons-grade plutonium.

Read more and access both the FY 2017 and FY 2016 reports at http://www.nnsa.energy.gov/aboutus/ourprograms/dnn/npcr.

Check Out Our Latest Blog

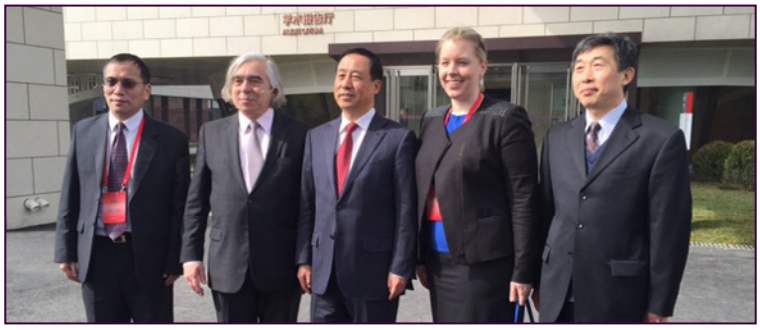
NNSA's Defense Nuclear Nonproliferation Leaders Gather in Nation's Capital

https://nnsa.energy.gov/blog/nnsa%E2%80%99s-defense-nuclear-nonproliferation-leaders-gather-nations-capital-0

China's New Center of Excellence on Nuclear Security Opens

On March 18, 2016, Secretary of Energy Ernest Moniz, accompanied by senior officials from DOE/NNSA and several DOE laboratories, the Department of Defense (DOD), and a host of international VIPs joined the China Atomic Energy Authority (CAEA) to commission China's State Nuclear Security Technology Center (SNSTC), its new nuclear security center of excellence. The SNSTC—a significant Chinese deliverable for the 2016 Nuclear Security Summit—was designed to meet China's domestic nuclear security training requirements, provide a forum for bilateral and regional best practice exchanges, and serve as a venue for demonstrating advanced technologies related to nuclear security. CAEA is responsible for management and operation of the center. Development has been a cost-shared project between DOE/NNSA, DOD, and CAEA/SNSTC.

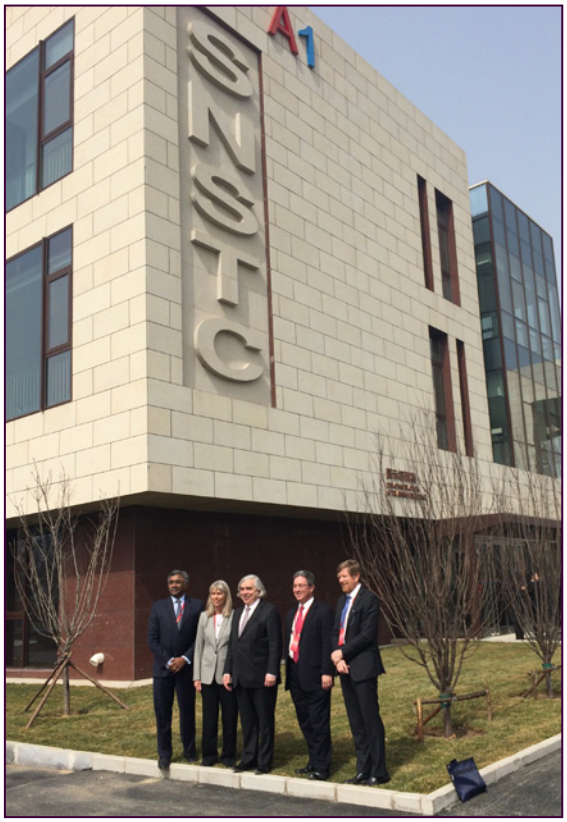
Learn more: http://nnsa.energy.gov/blog/nnsa-deputy-administrator-creedon-travels-china



Secretary Moniz with the project leadership: (L to R) CAEA Deputy Director Liu Yongde, Secretary Moniz, CAEA Chairman Xu, U.S. Project Manager Nancy Peterson, and SNSTC Director General DENG Ge.

SNSTC Director General DENG Ge describes the Mock Facility capabilities to Secretary Moniz, while (L to R) DOE Beijing Director Helena Fu, Principal Deputy Madelyn Creedon, and U.S. Project Manager Nancy Peterson look on.

Main entrance to newly opened facility.

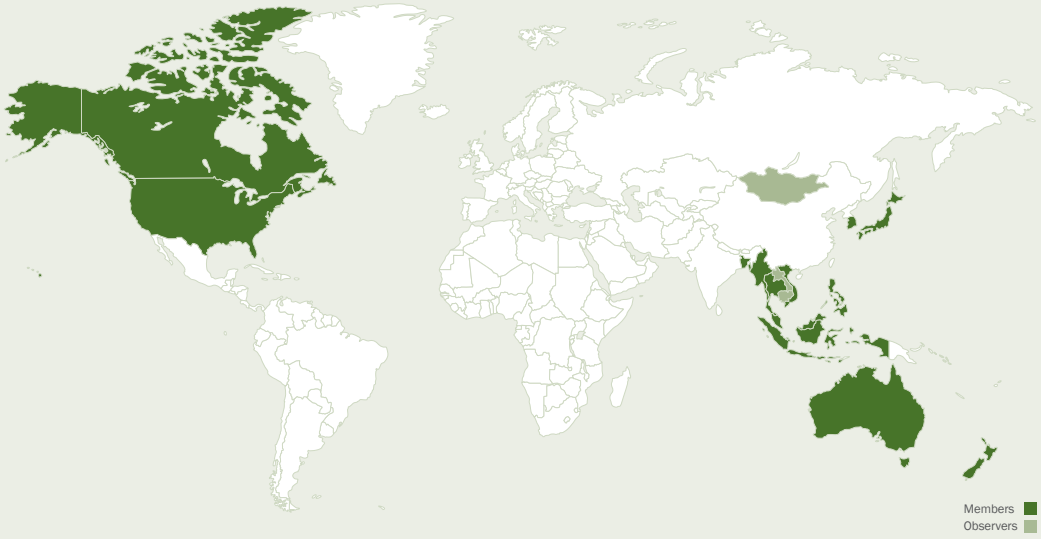


Secretary Moniz with the senior representatives of the U.S. National Laboratories involved in the project: (L to R) Dr. Tom Zacharia, Deputy Laboratory Director for Science & Technology, Oak Ridge National Laboratory; Ms. Jill Hruby, President and Laboratories Director, Sandia National Laboratories; Secretary Moniz; Dr. Steve Ashby, Laboratory Director, Pacific Northwest National Laboratory; Dr. Terry Wallace, Principal Associate Director, Los Alamos National Laboratory.

Regional Cooperation to Strengthen Safeguards in the Asia-Pacific

By Margot Minnini and Oksana Elkhamri

President Obama's decision over four years ago to "pivot" toward Asia represented an important strategic shift in American foreign policy and a rebalancing of U.S. economic and security engagement with Asia-Pacific countries. The United States has since supported a variety of regional initiatives aimed at promoting nuclear security and safeguards in Asia. When a new regional organization, the Asia-Pacific Safeguards Network (APSN) was established in 2010, DOE/NNSA became an early member and enthusiastic advocate. Launched on the initiative of Australia, Japan, the Republic of Korea, and Indonesia, APSN members collaborate to strengthen the quality and effectiveness of safeguards implementation in the Asia-Pacific region.



Asia-Pacific Safeguards Network

Under the terms of the Nuclear Non-Proliferation Treaty, each non-nuclear weapons state must submit its peaceful nuclear programs to inspections by the International Atomic Energy Agency (IAEA). Developing the technical expertise and infrastructure necessary to implement this international commitment can be daunting for national entities, particularly those with minimal nuclear infrastructures.

The APSN offers a unique regional framework to address this challenge through sharing of experiences and lessons learned, training to address priority needs, and fostering peer-to-peer networks that build Member States' confidence in their ability to support the nonproliferation regime.

Surrogate material is used for simulated physical inventory-taking during an APSN regional Safeguards Inspections Workshop exercise hosted by Indonesia.

Participants in the 6th APSN meeting held in Tokyo in November 2015.

Asia-Pacific – *Continued*

While its Members are government or government-affiliated entities, APSN ultimately is a professional network rather than a formal intergovernmental organization or a regional inspectorate. It has the flexibility to advance nonproliferation goals through meetings and technically-focused workshops that address matters of mutual interest, building bonds and collegial ties. To this end, APSN, with DOE/NNSA's support, has played an important role in welcoming Myanmar into the regional safeguards community and has signed a Memorandum of Understanding with the European Safeguards Research and Development Association (ESARDA).

Today, 15 Member States comprise the APSN, with several others expected to join at the upcoming 2016 Plenary. The IAEA holds permanent observer status. The Australian Safeguards and Non-Proliferation Office (ASNO) served for four years as inaugural Chair. In the words of the former Chair, Dr. Robert Floyd, "APSN is a wonderfully supportive community of practice where we assist one another in doing the best job we can at implementing safeguards in our national contexts. This is a good model for other regions of the world." The Chair role has now transitioned to Japan by a unanimous vote. Current Chair, Mr. Kazutoshi Aikawa, Director-General of Disarmament, Non-proliferation and Science Department of Japan's Ministry of Foreign Affairs, has expressed strong motivation to broaden collaboration with other institutions for strengthening the safeguards system to secure nonproliferation goals.

There are no fees to join the network; the APSN relies on the goodwill and financial support of its Members to host meetings, seminars, and training activities. Recognizing the importance of the APSN mechanism to build regional safeguards networks and know-how, DOE/NNSA will continue to work with the APSN Secretariat and like-minded partners to promote ASPN and foster inter-regional communication and capacity-building training.

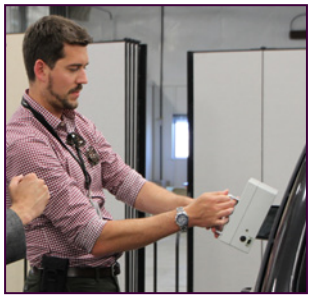
See the APSN website for more information: http://www.apsn-safeguards.org/.

Margot Minnini currently is DNN's International Nuclear Safeguards Engagement Program Manager for S.E. Asia. Oksana Elkhamri is a Senior Research Scientist at the Pacific Northwest National Laboratory. She has supported DOE/NNSA's safeguards engagement in Asia-Pacific for the past decade.

Gray Awarded Hutcheon Fellowship at IAEA

DNN has named Thomas Gray the first recipient of a fellowship established in honor of the late Dr. Ian Hutcheon, a longtime member of the scientific staff of Lawrence Livermore National Laboratory (LLNL). The fellowship supports a two-year assignment as a Junior Professional Officer in support of the International Atomic Energy Agency's (IAEA) Division of Nuclear Security.

During his 22-year tenure at LLNL, Dr. Hutcheon made significant contributions as group leader for the Chemical and Isotopic Signatures Group in Nuclear and Chemical Sciences Division and deputy director of the Glenn Seaborg Institute, Physical and Life Sciences Directorate. He was a key developer of nuclear forensics as both a field of scientific investigation and as a scientific discipline applied to national security.



Tom Gray practices using a handheld radiation detector during the NGFP orientation held at PNNL last summer.

At the time of his selection, Gray was serving in DNN's Front Office as part of the NNSA Graduate Fellowship Program (NGFP) administered by Pacific Northwest National Laboratory. Over the course of the next two years, Gray expects to continue developing his experience in nuclear security, albeit with a broader international perspective at the IAEA. "This fellowship represents an exciting opportunity: the IAEA's role in nuclear security continues to grow, and now that President Obama's Nuclear Security Summit agenda is winding down, that role will be even more important" Gray said. He will be assisting with IAEA's International Conference on Nuclear Security in December 2016.

To learn more, go to https://www.llnl.gov/news/nnsa-fellowship-honor-ian-hutcheon and http://nnsa.energy.gov/blog/secretary-moniz-awards-hutcheon-memorial-nonproliferation-fellowship-thomas-gray.

United States and the Republic of Korea Share Commitment to Peaceful Nuclear Uses

The first meeting of the High Level Bilateral Commission (HLBC) between the United States and the Republic of Korea (ROK) took place in Seoul on April 14, 2016. This new coordination mechanism was established under the new Agreement for Cooperation Between the United States of America and the Republic of Korea Concerning Peaceful Uses of Nuclear Energy (the U.S.-ROK 123 Agreement). The HLBC is co-chaired by U.S. Deputy Secretary of Energy Elizabeth Sherwood-Randall and ROK Vice Foreign Minister for Foreign Affairs Cho Tae-Yul, and will meet annually to review progress under the U.S.-ROK 123 Agreement.

About the 123 Agreement

The U.S.-ROK 123 Agreement entered into force on November 25, 2015. It allows for the continued export of nuclear material, equipment, and major components to the ROK and by ROK exporters to approved third countries, but does not provide the ROK with U.S. consent to enrich or reprocess U.S.-supplied nuclear material. The Administrative Arrangement (AA) to the U.S.-ROK 123 Agreement, signed by DOE Under Secretary for Nuclear Security and NNSA Administrator Lt. Gen. (Ret.) Frank Klotz and ROK Nuclear Safety and Security Commission Chair Un Chul Lee on April 1 on the margins of the 2016 Nuclear Security Summit, specifies the tracking and reporting procedures that the United States and the Republic of Korea will follow when implementing the 123 Agreement's provisions.

Chairman Un Chul Lee, left, of the Republic of Korea's Nuclear Safety and Security Commission and DOE Under Secretary for Nuclear Security and NNSA Administrator Lt. Gen. (Ret.) Frank Klotz signed the Administrative Arrangement to the Agreement for Cooperation.

U.S. Deputy Secretary of Energy Elizabeth Sherwood-Randall and Vice Minister for Foreign Affairs for the Republic of Korea Cho Tae-Yul co-chaired the first HLBC in April 2016.

About the HLBC

The HLBC was created as a senior-level forum to facilitate strategic dialogue and technical exchanges on peaceful nuclear cooperation between the United States and the ROK in the area of civil nuclear energy. It operates through four working groups that reflect the key priorities of President Obama and ROK President Park Geun-hye for the new 123 Agreement: spent fuel management, promotion of nuclear exports and export control cooperation, assured fuel supply, and nuclear security.

Deputy Secretary Sherwood-Randall and Vice Minister Cho announced the launch of the HLBC and established its four working groups during a meeting held in March 2016.

Accompanying Deputy Secretary Sherwood-Randall to the April HLBC meeting were U.S. delegation representatives from NNSA, DOE's Offices of Nuclear Energy and Environmental Management, the Department of State, the Nuclear Regulatory Commission, and the National Security Council.

Long-Term Cooperation

The HLBC is another example of the long-term relationship between the United States and its Korean partners. Working with organizations such as the Korea Institute of Nuclear Nonproliferation and Control and the Korea Atomic Energy Research Institute, the two countries have cooperated to develop, test, and deploy advanced nuclear safeguards technologies to improve nuclear verification capabilities.

Many elements in the Department of Energy support collaboration with the ROK. The U.S. National Nuclear Security Administration's Office of Defense Nuclear Nonproliferation (DNN) partnered with the ROK in establishing its nuclear security Center of Excellence, the International Nuclear Security Academy (INSA). INSA represents the realization of a high-priority commitment made by the ROK at the 2010 Nuclear Security Summit and reinforced during the 2012 Nuclear Security Summit held in Seoul. DNN provided key support throughout the design of the physical protection test bed at the facility and development of the training curriculum now being offered in the areas of safeguards, physical protection, and export control. Together, DNN and INSA reach out to third countries to participate in courses at INSA. Additionally, although they do not possess highly enriched uranium (HEU) themselves, the ROK has been an outstanding partner in HEU minimization efforts, both at the government and technical levels. The ROK's leadership in international HEU minimization, highlighted in its active participation at the Nuclear Security Summits, also is evident in ROK's work with the Europeans and United States to help develop a new high-density low enriched uranium fuel that can be used to convert high performance research reactors.

Finally, DNN and the Korean Customs Service (KCS) work together to combat nuclear smuggling. The radiation detection system, installed with support from DNN and now operated by KCS at the port of Busan, screens cargo passing through one of Asia's largest seaports.

See related press releases at:

http://energy.gov/articles/statement-first-meeting-united-states-republic-korea-high-level-bilateral-commission

http://energy.gov/articles/statement-launch-us-republic-korea-high-level-bilateral-commission-pursuant-agreement

http://www.nnsa.energy.gov/mediaroom/pressreleases/statement-signing-administrative-arrangement-agreement-cooperation-between

The Nuclear Security Summit and HLBC: Bringing Things Full Circle

President Barack Obama and then President Lee Myung-bak of the Republic of Korea shake hands during their press conference before the 2012 Nuclear Security Summit. *(Official White House Photo by Chuck Kennedy)*

The United States and the ROK share much in common, particularly in the area of nuclear security. The ROK took up the mantle of nuclear security by hosting the 2012 Nuclear Security Summit in Seoul. At the most recent Summit, the ROK continued its leadership role by sponsoring the "Supporting Nuclear and Radiological Terrorism Preparedness and Response Capabilities" Gift Basket, which was signed by 24 countries plus the United Nations and INTERPOL. Through the Gift Basket, 24 countries plus the United Nations and INTERRPOL agreed to a number of measures related to nuclear terrorism preparedness and response capabilities within their borders and in partnership with the international community. The Gift Basket also recognizes that ensuring adequate nuclear terrorism preparedness and response capabilities contributes to strengthening the interface between nuclear safety and security, an additional deterrent to attack. In keeping with the spirit of this Gift Basket, NNSA's Office of Counterterrorism and Counterproliferation continues to work with the ROK as a partner to strengthen preparedness and response capabilities to reduce risks and protect the public. The Nuclear Security Working Group of the HLBC may prove to be a venue for bilateral engagement to help meet Gift Basket commitments.

Competing for a Grade and Our Nuclear Security

By Vicki Hinkel, Photos by Lance King

Joining forces, Consolidated Nuclear Security, LLC and the University of Tennessee (UT) offer well-rounded training—both on the Knoxville campus and at Y-12 National Security Complex—for our nation's next generation of nuclear security decision makers. Y-12 recently hosted a tour and 3-D battle board challenge for graduate students. Like a chess game, the exercise involved strategic moves by a team protecting a mock nuclear facility and a team attacking the facility to seize control of the stored nuclear material.

When UT's Nuclear Security Science and Analysis class and Y-12 nuclear security subject matter experts conducted a day-long tour and battle board challenge in Oak Ridge, students caught a valuable inside-the-fence glimpse of the kinds of nuclear security they had studied in the classroom.

Ground rules were set before the battle board engagement—a simulated attack on an enriched uranium storage facility—began.

The blue team's leader (Michael Moore, nuclear engineering student, seated) described his team's next move to protect the virtual cache of enriched uranium. At the end of the day, Moore's team prevailed, successfully defending the stored nuclear material.

After the event, in preparation for the next semester, standing left to right, Y-12's Greg Verner, Howard Hall (UT), Jeff Knott, and John Gill (UT) summarized the battle board event and the lessons learned.

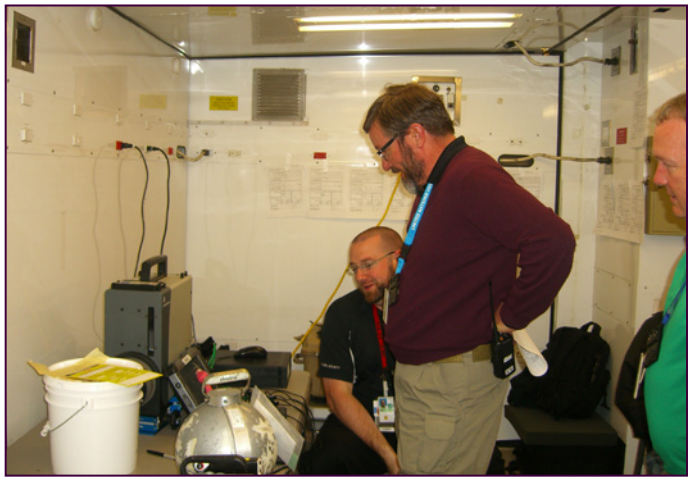
Operation Sputnik—First Remote Deployment of Mobile Plutonium Facility

When a country finds itself in a position where it will dismantle a nuclear weapons capability (sometimes termed a "rollback"), the United States might be required to rapidly deploy capabilities to support and verify the dismantlement. The Mobile Plutonium Facility (MPF) is being developed for such a foreign rollback scenario to characterize, stabilize, and repackage plutonium-bearing materials. It is housed in a series of rapidly deployable modules configured in intermodal shipping containers like those seen on railcars and container ships. The MPF was developed by Savannah River National Laboratory (SRNL) under the auspices of DNN's Office of Nuclear Material Removal, with nondestructive assay characterization support provided by Los Alamos National Laboratory (LANL) and Pacific Northwest National Laboratory (PNNL) under the guidance of DNN's Office of Nuclear Verification.

In December 2015, the three national laboratories and two offices in DNN conducted the first-ever exercise involving partial deployment of the MPF. The exercise focused on deploying the MPF's "transportainers" (shipping containers) that house the radiography, nondestructive assay, power, and satellite communications units. Dubbed "Operation Sputnik" because it represented the first satellite deployment of MPF modules, the measurement campaign exercise went off without a hitch.

The radiography and nondestructive assay modules, or transportainers, of the MPF deployed at LANL during Operation Sputnik.

Held at LANL, the measurement campaign exercised the nondestructive assay and radiography capabilities on actual sealed special nuclear material standards and sources. Together, these two analysis techniques provide rapid, real-time, and non-intrusive characterization of an unknown or suspect radioactive material so that the best technical path forward for removal can be identified.



Team members working inside an MPF transportainer during Operation Sputnik.

Members of the SRNL/LANL/PNNL team after successfully completing Operation Sputnik in December 2015.

Expert Profile: NSDD Chief Scientist Retires

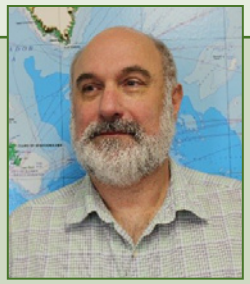
Dr. Mark Abhold retired from Los Alamos National Laboratory (LANL) in March 2016 after 30 years of dedicated public service. Over the course of his career, Dr. Abhold made contributions in many areas, including nuclear safeguards, development of nuclear threat detection instrumentation, and countering nuclear smuggling. Most recently, he served as Chief Scientist to DNN's Nuclear Smuggling Detection and Deterrence (NSDD) Program. NSDD works with international partners around the world to enhance their capabilities to deter, detect, and investigate the smuggling of nuclear and radiological materials.

When asked what first piqued his interest in the field of nuclear security, Dr. Abhold explains that it "happened by chance when one of my college professors assigned me to a special project on the health consequences of radon build-up in homes." The professor encouraged Mark to consider a graduate degree in nuclear engineering. A few years later, Mark finished his PhD and moved forward on the path that eventually brought him to NSDD.

Along the way, Dr. Abhold helped develop and install safeguards systems in Japan, developed equipment standards used by the International Atomic Energy Agency (IAEA), helped train IAEA inspectors, and assisted with deploying nuclear threat detection equipment at the Port Authority of New York and New Jersey.

During his tenure with NSDD, Dr. Abhold led efforts to conduct performance testing on radiation detection systems, such as radiation portal monitors, mobile detection vans and handheld equipment. "Mark's work was instrumental in helping NSDD understand detection equipment performance and maximize its effectiveness in detecting special nuclear materials, such as highly enriched uranium and plutonium," said NSDD Director Laurel Cotton. "Mark helped ensure that we have a sound technical and scientific basis for all that we do."

While with NSDD, Dr. Abhold also led threat analyses, provided technical reachback for radiation alarms, mentored countless junior staff, and briefed key stakeholders—including Congress, the Office of Management and Budget, and the Government Accountability Office—on the technical aspects of radiation detection systems. "Mark's ability to communicate complex technical topics to any audience is truly remarkable," said Ms. Cotton.



Honors and Achievements

- Commendation from the U.S. House of Representatives Select Committee on Homeland Security
- Los Alamos Distinguished Performance Award (two-time recipient)
- Los Alamos Achievement Award
- Outstanding Teaching Award, University of Washington
- Numerous publications
- Co-authored the textbook, *Nuclear Safeguards, Security, and Nonproliferation; Achieving Security with Technology and Policy*

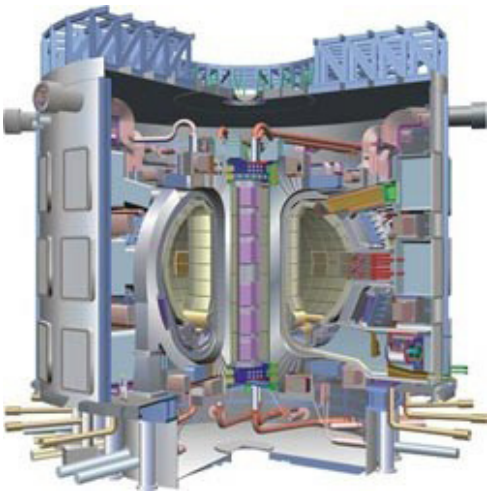
Distinguished Service

- Los Alamos National Laboratory
  - Advanced Technology Group, Chief Scientist for the NSDD Program
  - Rad/Nuc Threat Reduction at the Center for Homeland Security, Associate Director
  - Advanced Technology Group at the TA-18 site—developed nuclear threat detection instrumentation
  - Safeguards Science and Technology Group—Measured the remaining uranium content in high level uranium fuels provided by the United States to foreign countries under the Atoms for Peace program
- TRW Inc.
  - Developed requirements for the Yucca Mountain high-level waste repository
  - Worked on classified spacecraft and ballistic missiles designing electronics and spacecraft structures that would survive radiation from a nuclear burst in or above the atmosphere; helped design a military satellite now displayed in the Smithsonian National Air and Space Museum's Udvar-Hazy Center

Take it to the Cloud—A Secure System for Export-Controlled Computing Technologies

By Timothy E. Valentine

Thanks to support from NNSA's Office of Defense Nuclear Nonproliferation and DOE's Office of Nuclear Energy, certain foreign nationals working or studying in the United States and participating in bilateral or multilateral activities can access computer modelling codes critical to their work in nuclear physics, mathematics, and engineering through a secure cloud system. The Radiation Safety Information Computational Center (RSICC) at Oak Ridge National Laboratory developed and deployed the secure cloud system to provide approved foreign nationals access to export-controlled computing tools. This system addresses the concern of providing access to export-controlled modelling and simulation tools while also fostering international cooperation in the interest of the U.S. Government. RSICC's secure cloud server contains the Monte Carlo N-Particle (MCNP) transport code and the Reactor Excursion and Leak Analysis Program (RELAP) code, both under the jurisdiction of the NNSA, as well as the SCALE code system under the jurisdiction of the Department of Commerce. The server has a peak theoretical performance speed of 24.6 teraflops that can easily accommodate 100 to 200 simultaneous users. Approval to gain access to the system depends on the requester's citizenship, location, and end use.



Conceptual design of the ITER Fusion Reactor. Approved project participants are using nuclear simulation codes available through RSICC's secure cloud to aid design of the ITER shielding and safety systems.

RSICC is an information analysis center that collects, archives, evaluates, synthesizes, and distributes information, data, and codes used in various nuclear technology applications. RSICC retains more than 2,000 software packages provided by code developers from various federal and international agencies. RSICC's customers include scientists, engineers, and students from around the world who require access to such computing codes (source and/or executable versions) and data to promote ongoing research and education programs, help ensure nuclear and radiological safety, and advance nuclear technology. However, in light of nonproliferation and national security concerns about sharing codes and data that could be diverted from their intended purposes, NNSA helped develop alternatives—such as the secure cloud server.

NNSA's support of the secure cloud server benefits U.S. educational programs and important international collaborations. Currently, there are approximately 50 individuals actively using the secure cloud server for a variety of applications including nuclear security, nonproliferation, reactor design, medicine, and fusion. Most of the users are foreign nationals studying at U.S. universities. An example of a significant international collaboration is with ITER, the international nuclear fusion megaproject under construction in the south of France. Access to the secure cloud has been provided to allow ITER contributors to use the MCNP code for the design of shielding and safety systems. Development of the shielding for ITER is important to ensure safety while minimizing excess conservatism in the design that could drive up its costs. Without access to the secure cloud server, the project participants would not be able to meet their obligations to design the shielding and safety systems.

RSICC Director Dr. Timothy E. Valentine is responsible for leading and expanding the services and operations of the center as well as international collaborations with the Nuclear Energy Agency of the Organization for Economic Cooperation and Development and the Japanese Research Organization for Information Science and Technology. Prior to his role at RSICC, Dr. Valentine was detailed to the U.S. Senate Committee on Energy and the Natural Resources as a science and nuclear policy advisor.

Training in Tbilisi Facility Provides New Perspectives for IAEA Inspectors

By Cornelia Brim

The Office of Nonproliferation and Arms Control (NPAC) sponsors training at the Andronikashvili Institute of Physics (AIP), a "cold" nuclear facility in Tbilisi, Georgia, to provide International Atomic Energy Agency (IAEA) inspectors with a new perspective on environmental sampling strategies. IAEA inspectors verify the correctness and completeness of a State's declared nuclear materials and nuclear-related activities by conducting inspections of nuclear facilities or locations through which nuclear material is expected to flow. The training at AIP prepares inspectors to develop and carry out sampling plans for facilities they visit, making the most of limited resources.

Since 2011, NPAC has supported Pacific Northwest National Laboratory (PNNL) experts to conduct an annual week-long class for IAEA inspectors in a now-closed nuclear facility. The AIP training opportunity is unique: the Soviet-era plant was built in the 1960s for medical isotope production. It processed materials with short half-lives, and was shuttered in the early 1990s. The facility still has all the processing infrastructure in place—from hot cells with operational manipulators, to gloveboxes, and the transfer trolley—but there are no radiological concerns and class participants can access the shielded areas of the facility that they would not be able to access during their inspections of operating nuclear facilities.

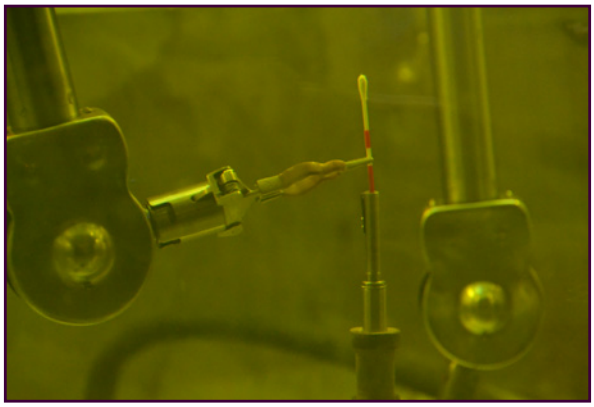
"During the training students are able to crawl into a hot cell. Once inside, they are able to examine the inside features and they get a perspective they never would be able to get on the outside looking in," said Bruce Reid, one of the PNNL instructors of the course. "We also teach them what to look for if a facility is trying to conceal undeclared activities."

The type of environmental samples studied in the class are "swipe" samples—a piece of cotton cloth or a swab is swiped over a surface, bagged, and analyzed for trace materials associated with nuclear-related activities. If an inspector can only take a limited number of samples, that inspector has to be judicious about selecting locations for sampling in a facility. If a facility is suspected of conducting

Pairs of inspectors work together to sample a waste tank.

clandestine activities, having a more detailed hands-on understanding of the equipment and typical processes in nuclear facilities might inform decisions about sampling locations.

Class participants prepare to take samples (top) and an IAEA inspector works the manipulators (bottom) and in the Tbilisi facility.



Using the manipulators inside a hot cell to take an environmental sample.

Each class consists of 10 students selected by the IAEA and a training coordinator, who provides feedback for next year's course. To make the training realistic, students are paired and wear protective gear for the exercises in the Tbilisi facility, even though there are no radiological concerns.

"It's wonderful to interact with the IAEA inspectors. We teach them new techniques and skills, but this training enables all of the instructors and students to benefit from one another's experiences," said Joel Tingey, a PNNL instructor.

Instructors also work to instill situational safety awareness among their students. "IAEA inspectors visit many different types of facilities during their careers. We hope that this training will reinforce the message to be observant, think about the mission, and watch out for your fellow inspectors," said Reid.

The week of instruction culminates in an exercise during which pairs of students plan and carry out the environmental sampling based upon a scenario developed by the instructors. The instructors deliver the analysis results to each pair, based on the sampling strategy. Students then present their plan and results to the class.

Cornelia Brim is a senior communications specialist at PNNL.

COUNTRY PROFILE: UKRAINE

Committed to its Non-Nuclear Status

The United States established diplomatic relations with Ukraine in 1991, following its independence from the Soviet Union. Since then, DOE/NNSA and Ukraine have cooperated on a wide range of nuclear security and nonproliferation projects. Ukraine has long played an important role in global nuclear nonproliferation. Ukraine voluntarily gave up its inherited stockpile of Soviet nuclear warheads (which in 1991 made Ukraine owner of the third largest nuclear warhead stockpile in the world). At a strategic crossroads between Russia and Western Europe, as well as between the Middle East/Black Sea region and Europe, Ukraine has cooperated with the United States and others to strengthen its capabilities to counter illicit nuclear material smuggling across its territory. And having a civilian nuclear power infrastructure that also is marked by the long-term damage of the 1986 Chornobyl nuclear reactor accident, Ukraine is active in the global effort to strengthen nuclear security and ensure the safe, secure, and safeguarded use of nuclear power.

DNN Deputy Administrator Anne Harrington recently visited Ukraine to celebrate the 20th anniversary of the Science and Technology Center in Ukraine (STCU). Learn more about NNSA's collaboration with the STCU and Harrington's visit at http://www.nnsa.energy.gov/blog/nnsa-deputy-administrator-travels-ukraine.

Neutron Source Facility

While in Ukraine, Harrington, along with representatives of DNN's Office of Material Management and Minimization (M^3) visited the state-of-the-art Neutron Source Facility at the Kharkov Institute of Physics and Technology (KIPT) that was constructed in cooperation with M^3 in exchange for the removal of all highly enriched uranium from Ukraine in 2012. The experimental facility consists of an accelerator-driven subcritical assembly using low enriched uranium fuel and will allow for advanced research and medical isotope production when fully operational.

Since construction was completed in March 2014, DOE/NNSA and KIPT have been cooperating on actions needed to make the facility fully operational, such as fabricating and installing supporting equipment. Ukraine started commissioning the facility in March 2016.

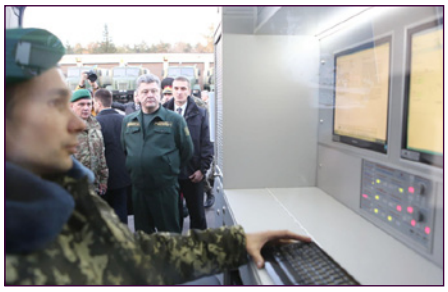
Combatting Nuclear Smuggling

DNN's Office of Nuclear Smuggling Detection and Deterrence (NSDD) has been working with the State Border Guard Service of Ukraine since 2005 to address illicit trafficking in nuclear and other radioactive materials. NSDD has installed radiation detection systems at 68 points of entry across Ukraine, with 12 new sites scheduled for completion in FY 2016, bringing the total to 80 equipped points of entry. The State Border Guard Service has assumed responsibility for maintaining its systems on schedule.

Ukraine's Nuclear History in Brief

- **1986** — Nuclear accident at Chornobyl Nuclear Power Plant (while still part of the Soviet Union)
- **1991** — Became independent from the Soviet Union and elected the first president of Ukraine
- **1992** — Signed the Lisbon Protocol, agreeing to transfer nuclear warheads and missiles to Russia
- **1993** — Established the STCU
- **1994** — Acceded to the Nuclear Non-Proliferation Treaty (NPT) as a non-nuclear weapons state
- **1998** — Entered safeguards agreement under NPT into force
- **2005** — Ratified the IAEA Additional Protocol
- **2012** — Completed removal of all highly enriched uranium from within its borders
- **2014** — Completed construction of Neutron Source Facility

Country Profile: Ukraine – *Continued*



President Poroshenko of Ukraine (center) inspects a Mobile Detection System van provided by NSDD in 2014.

NSDD also delivered 12 mobile detection systems to the State Border Guard Service of Ukraine for use along green borders and near the contested border regions. During FY 2016, NSDD will provide the State Security Service with two mobile detection systems and associated training.

Radiological Security

DNN's Office of Radiological Security (ORS) has worked with Ukraine to provide physical protection upgrades at 71 active buildings that use and store radioactive and nuclear material, including 48 medical facilities, 15 storage facilities, 5 research facilities, and 1 industrial facility. In addition, ORS has provided training in physical protection and security management principals to the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) and several of its licensees that use and store radioactive sources. Future ORS cooperation in this area will include additional physical protection upgrades at high priority sites, physical protection training for SNRIU inspectors, alarm response training for first responders to a security incident, and centralized monitoring to monitor high priority alarms for security incidents at radiological facilities. ORS also works closely with organizations in Ukraine to locate disused and orphaned radioactive sources and consolidate those sources at secure storage facilities.

Licensing, Export Control, and Enforcement

Since 1996, with support from the U.S. Department of State's Export Control and Related Border Security Program (EXBS), DNN's International Nonproliferation Export Control Program (INECP) has helped establish and train a core group of technical experts to support the State Service for Export Control of Ukraine.

In 2001, INECP launched—with the State Customs Service of Ukraine—development of Commodity Identification Training (CIT) using technical experts at the State Customs Academy in Dnepropetrovsk and Ukraine's nuclear institutes. Subsequently, the Academy incorporated CIT into its cadets' curriculum and developed a professional development course for active Customs inspectors. Since the CIT cadet course was first offered in the fall of 2004, approximately 900 active inspectors have attended CIT either through regional training workshops or the week-long course at the Academy. The Ukrainian national CIT program reached a milestone in September 2014 when the CIT was fully delivered by the new trainers from the Directorate for Specialized Training and Canine Support and the Customs Central Lab.

INECP also conducts workshops and conferences to raise awareness of Ukrainian manufacturers of nuclear and dual-use commodities. Resources for enterprises developed with INECP oversight include newsletters and publications on nonproliferation and export control and a dedicated website to deliver information to exporters about export controls and changes in Ukrainian export control legislation.

Safeguards Cooperation

Since 2009, DNN has cooperated with Ukraine to strengthen Ukraine's International Atomic Energy Agency (IAEA) safeguards infrastructure and address its facility-specific safeguards challenges. To date, much of DNN's safeguards work has focused on tackling complex material accountancy issues arising from the catastrophic accident at the Chernobyl Nuclear Power Plant (ChNPP). This material remains subject to IAEA safeguards. Major construction work on a new facility to more safely enclose the damaged reactor unit unearthed nuclear fuel debris. DNN led the development and implementation of an optimized radiation measurement system (the Chernobyl Drum Assay System, or CDAS) to help Ukraine characterize and declare this material to the IAEA. CDAS jointly serves both Ukraine's domestic regulatory responsibilities and the IAEA's safeguards work. Following up on this successful activity, DNN is partnering with Ukraine to address other safeguards challenges associated with unique remediation facilities at ChNPP and is supporting training activities to strengthen the effectiveness of Ukraine's state system of accounting for and control of nuclear material.

FAQs: 2016 Nuclear Security Summit

The fourth Nuclear Security Summit (NSS) concluded on April 1 where it began six years ago, in Washington, D.C. The Summit process, first announced by President Obama in his April 2009 speech in Prague, afforded unique opportunities for leaders to engage on, and reinforce their commitment to, addressing the threat of nuclear and radiological terrorism. The Summits also catalyzed and accelerated national and international actions in the intervening years, leading to tangible, meaningful, and lasting nuclear security accomplishments.

How many delegations participated in the 2016 NSS?

Fifty-two countries attended the Summit. Most were represented at the Head of State or Government level. Four international organizations participated as observers. See the list of the delegations that attended at http://www.nss2016.org/attending-delegations/.

What were the key outcomes from the 2016 Nuclear Security Summit?

The 2016 NSS resulted in a high-level Communiqué, five institutional Action Plans, and several new Gift Baskets. The Communiqué reinforced the fundamental commitments of states to key nuclear security principles and noted that the conclusions of all four Summits would guide States' actions going forward. Early on, participants identified strengthening the international nuclear security architecture for nuclear and radiological security issues as an important method to sustain and build on the Summit process and its accomplishments. The five Action Plans describe how Summit participants can support key international organizations and institutions—the International Atomic Energy Agency (IAEA), INTERPOL, United Nations, Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, and the Global Initiative to Combat Nuclear Terrorism. Gift Baskets contain national and multilateral nuclear security commitments on specific topics that do not apply to all participants or for which there was not consensus support. All agreed NSS 2016 documents plus national statements, progress reports, joint statements, and fact sheets for key initiatives can be viewed at http://www.nss2016.org/.

How did DNN help achieve commitments set throughout the NSS process?

DNN made significant contributions to many of the most visible Summit deliverables, in cooperation with our international partners. For example, since April 2009, more than 3.2 metric tons of vulnerable HEU and plutonium material have been removed or disposed of; 14 countries and Taiwan have become HEU-free; physical security upgrades have been completed at 32 buildings storing weapons-usable fissile materials; and radiation detection equipment has been installed at 328 international border crossings, airports, and seaports to combat illicit trafficking in nuclear materials.

The complete list of U.S. accomplishments throughout the NSS process is available at: http://www.nss2016.org/document-center-docs/2016/3/31/national-progress-report-united-states-of-america. DNN's ongoing work is evident throughout the list.

How will the activities initiated through the Nuclear Security Summits continue?

In addition to the activities called for in the Action Plans, 39 participants in the 2016 NSS agreed to sustain action and ambition on nuclear security after the 2016 NSS to address continuing and evolving nuclear security challenges, including by establishing a Nuclear Security Contact Group. The group will convene at least once per year on the margins of IAEA's annual General Conference or other multilateral meetings. Read the full statement about the Nuclear Security Contact Group at https://www.whitehouse.gov/the-press-office/2016/04/01/joint-statement-sustaining-action-strengthen-global-nuclear-security.

What will be DNN's role in supporting follow on activities to the Summits?

DNN's core activities remain central to implementing U.S. commitments and making it possible for our international partners to achieve their goals. DNN will continue active engagement with our counterparts and remain engaged with the relevant international organizations to ensure we continue to build on the progress made through the Summit process.

To learn more about NNSA's support to the 2016 Nuclear Security Summit, go to http://nnsa.energy.gov/blog/nnsa-keeps-promises-borne-out-nuclear-security-summit

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