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

DNN Sentinel

DEFENSE BY OTHER MEANS

VOL. X, NO. 1

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Rebuilding, Re-establishing, and Renewing Our Partnerships

DNN SENTINEL:
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https://www.energy.gov/nnsa/missions/nonproliferation

From the Deputy Administrator

Over the past year, we emerged from COVID-19 pandemic restrictions and returned to the field to work with partners around the world. One of our top priorities is working with partners to limit the spread of nuclear weapons. It sounds simple, but at the core, nonproliferation, and the strategic stability it supports, is predicated on agreement. For the concept of nonproliferation to be successful, the global community must agree that nuclear weapons (and all weapons of mass destruction) should be limited. DNN's work seeks to strengthen the resolve of our allies and attract skeptical countries to a system which seeks to halt the spread of weapons technology. Our partnerships aim to limit the states that have or seek nuclear weapons, including by reinforcing our relationships which directly contributes to the U.S. strategic posture globally – the fewer WMD states, the more we can focus resources on other threats.

2023 has been the year of rebuilding, re-establishing, and renewing our global partnerships. DNN resumed our nonproliferation work around the world in full force after more than two years of a pandemic that largely prevented in-person engagements. DNN works with 168 countries around the world, and these partnerships are coming out on the other side of the pandemic stronger than before because we have a renewed sense of urgency. Throughout the pandemic, we sustained many of our partnerships virtually, but nothing matches in-person collaboration. International relations are not only about relationships between countries' governments, but also about the trust between individual professionals. Sharing coffee breaks, meals, culture, and laughter is just as important to advancing our shared goals as the technical work we pursue together.

We can accomplish more together than as individual actors. As the United States National Security Strategy affirms, "Our partnerships around the world are an indispensable element contributing to international peace and stability," through which we "act with common purpose and in common cause." Now more than ever, we need to be resolute in our messaging to international partners on the enduring importance of nuclear nonproliferation norms and nuclear security best practices. We must continue robust technical and policy cooperation with the International Atomic Energy Agency and other multilateral institutions to improve nuclear safeguards, security, and safety.

Finally, this issue contains a profile of Dave Huizenga. So many of you had the opportunity to work with and learn from Dave, and so did I. I am grateful for his service, his mentorship, and his friendship. Thank you for your interest in this edition of the Sentinel and your commitment to nonproliferation. The pages that follow highlight DNN's array of partnerships that make our country and world safer.

Corey

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NNSA ARTICLES

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Reimagining Response Integration and Partner Engagement

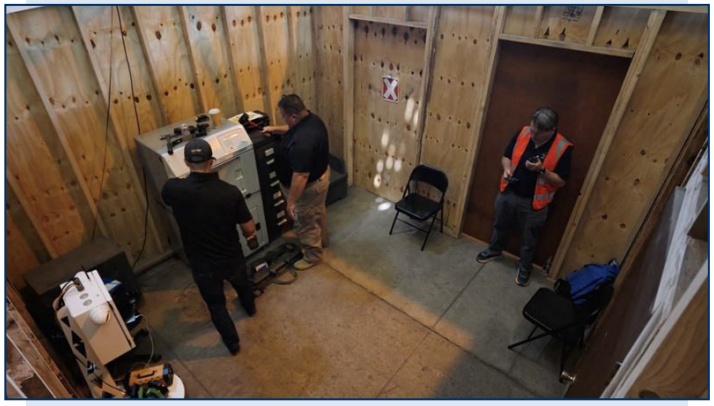
By Kyle Mitchell

From the start of the COVID-19 pandemic to today, law enforcement agencies and site response organizations across the United States have experienced myriad challenges, including staffing shortages, constantly shifting priorities, and unprecedented spikes in violent crime. Prior to the pandemic, the Office of Defense Nuclear Nonproliferation's Office of Radiological Security's (ORS) response force training had been conducted in classroom settings or through a series of exercises. However, ORS's Domestic Response Integration team recognized in early 2020 that partners' operational environment was drastically changing due to the pandemic. Pulling from their diverse experiences in law enforcement, hospital security management, site response, and exercise planning and execution, the team reimagined response engagement with local law enforcement and site partners.

The Domestic Response Integration portfolio is primarily supported by Pacific Northwest National Laboratory, Sandia National Laboratories, and the Y-12 National Security Complex. Program managers and their teams worked tirelessly to implement virtual meetings to sustain partner relationships, build augmented and virtual reality tools to support engagements, and deliver virtual training courses to ORS partners. The shift in strategy was challenging, but provided unique opportunities to identify and apply lessons learned.

The team created the Radiological Security Awareness and Response Exercise (RSARex) concept to measure a partner's current ability to respond to a radiological theft scenario. The results help to better identify what ORS workshops and resources are needed to improve response capabilities. The exercise takes one hour to complete and includes just-in-time training, exercise iterations, and a debrief. The partner runs multiple iterations of the exercise throughout the day across multiple divisions, units, and shifts. The end state is to exercise the maximum number of officers with minimal operational impact, as opposed to exercising limited resources in a day-long event.

An exercise controller observes as composite adversaries attempt to break open a mock blood irradiator.



Members of the Baltimore Police SWAT Team enter the mock irradiator room to interrupt adversaries.

ORS piloted the first RSARex in July 2022. The exercise achieved positive results in attendance and follow-on opportunities and served as a proof of concept for the RSARex model. Since then, two additional RSARex have yielded similar outcomes. Hundreds of officers in these cities now have an elevated awareness of radiological security and response, and agencies have expressed increased interest in ORS partnership. Prior to RSARex, there was limited opportunity for law enforcement and sites to exercise joint capabilities outside of small-scale tabletop exercises. RSARex brings both entities together for a more collaborative approach to improving radiological security.

Relationship building and collaboration are cornerstones of effective integration of response organizations. Hybrid engagement options and forward-leaning approaches have opened doors and presented new opportunities in the security response realm. As threat landscapes and operational challenges continue to evolve, the ORS Domestic Response Integration team will continue to pursue enduring relationships with our partners in innovative and resourceful ways.

Kyle is on an M&O rotation from Y-12 National Security Complex. He brings 20 years of combined experience in law enforcement, domestic and international response training, and hospital security management to support the ORS Domestic Response Integration portfolio.

Accelerating the Adoption of Electron Beam and X-Ray Technologies to Permanently Reduce the Security Risk of High-Activity Sources and Promote Sustainable Economic and Environmental Prosperity

By Natasha Barqawi

A core part of Defense Nuclear Nonproliferation's Office of Radiological Security's (ORS) mission is to minimize the risk of high-activity radioactive sources being used as radiological dispersal devices by reducing the global reliance on these sources through the promotion and development of non-radioisotopic alternative technologies. ORS collaborates with international partners to co-host regional workshops that raise awareness of technology options and facilitate an exchange of experiences in using or developing electron beam (E-Beam) and X-Ray technologies that can replace Cesium-137 (Cs-137) and Cobalt-60 (Co-60) devices.

Delegates from ORS partner countries in the Asia Pacific learn about E-Beam/X-ray Technologies in Daejeon, South Korea.

The focus of these workshops is to provide actionable information to potential end users and other stakeholders interested in adopting machine-based ionizing radiation technologies in a variety of sectors, including medical device sterilization, food sterilization, phytosanitary treatment of agricultural commodities, resource reuse, and other emerging applications. These workshops also address information gaps on emerging E-Beam and X-Ray devices as well as the lack of resources related to the operation of these technologies and integrate input from the user community, project stakeholders, and beneficiaries through presentations from global partners. ORS began implementing these E-Beam and X-Ray workshops in 2019 with partners in Argentina, which sparked interest and projects in replacing Cs-137 and Co-60 devices with machine-based ionizing radiation technologies in the region. The renewal and establishment of new partnerships in this region, and the positive impact of the discussions, prompted other workshops to take place across the globe.

In November 2022, in Daejeon, South Korea, ORS and South Korea's Regional Office of the International Atomic Energy Agency (IAEA)'s Regional Cooperative Agreement focused on East Asia and Pacific (RCARO), held a workshop on E-Beam and X-Ray adoption in Asia and the Pacific. The workshop included 127 attendees from ORS partner countries in the Asia Pacific, and included government, private sector, non-governmental organizations, and technology developers. Speakers and panelists presented on the benefits of E-Beam and X-Ray, ongoing research into new uses of E-Beam and X-Ray in their countries, different ways to overcome challenges to implementation, and plans for expansion. The workshop included a trip to the Korea Atomic Energy Research Institute's Advanced Radiation Technology Institute and the Radiation Instrument Standardization Research Center of the Korean Association for Radiation Application. The event was successful in building a strong partnership between RCARO and ORS which led to the implementation of a five-year project focused on further encouraging the use of E-Beam and X-Ray in Asia and the Pacific in different applications spaces.

The most recent E-Beam and X-Ray workshop took place in March 2023 in coordination with the Moroccan National Center for Nuclear Energy, Science, and Technology (CNESTEN) in Rabat, Morocco. Participants from Africa, the Middle East, and North Africa had the opportunity to interact with representatives from industry, technology providers, experienced entrepreneurs, and business leaders who successfully implemented E-Beam and X-Ray projects around the world. A visit to the irradiator facility of the National Institute of Agronomic Research allowed attendees to familiarize themselves with an operational, commercial E-Beam facility in the region. Several partners expressed interest in feasibility studies on adopting E-Beams, and initial discussions on these studies are underway. The workshop in Morocco also drew attention from the IAEA. Technical Cooperation – Africa has proposed a follow-on workshop which will be held specifically for high-level officials and ministers from Africa to learn more about E-Beam and X-Ray technologies and their economic viability and beneficial societal impacts for their countries.

ORS will continue these workshops to promote long-term, permanent risk reduction of high-activity sources and further our relationships with partners around the world.

Natasha Barqawi is a contractor for the National Nuclear Security Administration working on the International Alternative Technologies portfolio for the Office of Radiological Security.

Urgent Assistance to Ukrainian Partners in a Time of War

By Zachary Johnson and Bradley Brincka

On February 24, 2022, Russian mechanized forces crossed the Belarus border into Ukraine, capturing the Chornobyl Exclusion Zone. During their five-week occupation of the decommissioned nuclear power plant, Russian soldiers destroyed all of Chornobyl's radiation portal monitors (RPMs), threatened the Exclusion Zone Authority's Ukrainian staff, and ransacked the main administrative building. Inexplicably, the Russians also dug trenches and encamped in the highly radioactive Red Forest, potentially exposing themselves to dangerous levels of radiation.

The swift Russian occupation of Chornobyl prominently placed nuclear and radiological dangers at the forefront of the conflict. Since the Russian invasion began, those anxieties have only heightened with Russia's militarization of Ukraine's Zaporizhzhya Nuclear Power Plant and Vladimir Putin's threats of nuclear weapon use.

The Office of Defense Nuclear Nonproliferation's Nuclear Smuggling Detection and Deterrence (NSDD) program was uniquely positioned to respond to the rapidly evolving crisis. Since 2005, NSDD has cooperated with Ukraine on counter nuclear smuggling (CNS) activities and effectively maintained partnerships with Ukraine's State Border Guard Service, State Security Service, National Guard, and National Police. Since Russia's renewed invasion, the number of Ukrainian partners expanded significantly to include the State Emergency Services, State Nuclear Regulatory Inspectorate, State Bureau of Investigation, Chornobyl Exclusion Zone Authority, Ministry of Defense, and others.

Training Exercise at the George Kuzmycz Training Center

NSDD has worked diligently to deliver rapid assistance to Ukrainian partners and address their acute shortage of radiation detection equipment. One of the first projects post-invasion was cooperating with NNSA's Office of Counterterrorism and Counterproliferation to provide mobile detection systems, handheld radiation detection equipment, and remote radiation sensors to critical partners in Ukraine. Since then, NSDD has delivered hundreds of radiation detection pagers, handheld radiation detectors, communications equipment, and more to a multitude of Ukrainian agencies.

In addition to providing equipment, NSDD has provided training focused on how to effectively operate radiation detection systems. With the indispensable support of the national laboratories, subject matter expert trainers, and other offices within NNSA, NSDD routinely facilitates training events for Ukrainian partners, virtually and in-person in neighboring countries. The training topics have included operator training, standard operating procedures development, and consequence management. More recently, NSDD provided training to Ukrainian scientists and technical experts at the George Kuzmycz Training Center in Kyiv, who in turn conducted equipment and safety training for Ukrainian officers

Facing the prospect of a protracted conflict, NSDD is increasing its assistance to Ukrainian partners: widespread radiation pager deployment to first responders, installation of CNS systems along Ukraine's borders with Belarus and Moldova, replacement of RPMs in the Chornobyl Exclusion Zone, and more. Thanks to its unique partnerships spanning the federal government, national laboratories, and international partners, NSDD is well-positioned to continue supporting a capable Ukraine in the present and a safer Ukraine in the future.

Zachary Johnson serves as Country Manager in the Office of Nuclear Smuggling Detection and Deterrence. Bradley Brincka is a Presidential Management Fellow in the Office of Nuclear Smuggling Detection and Deterrence and is on the Ukraine Country Team.

Volcanic Eruption Tests the Nuclear Explosion Monitoring Community's Techniques

By Gene Ichinose, Keehoon Kim, and John Lazarz

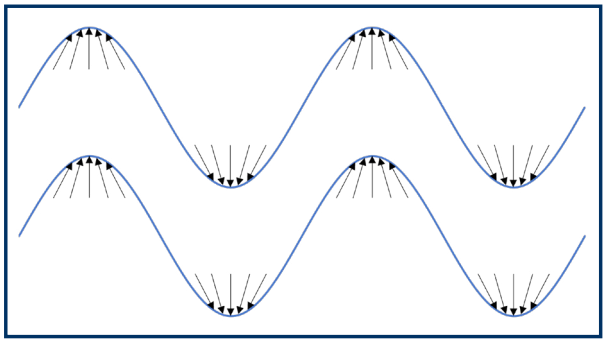
Volcanic activity at the Hunga Tonga–Hunga Ha'apai undersea volcano, 40 miles north of country of Tonga's main island, began with intermittent small eruptions on December 20, 2021, reaching a powerful explosion on January 15, 2022. The scale of Hunga Tonga–Hunga Ha'apai eruption was initially comparable to the 1990 Mount Saint Helens eruption, when considering the amount of erupted material, plume height, and duration. However, Hunga produced an unusually large plume for an eruption of its size. Satellite imagery showed the plume blasted through the stratosphere in 30-60 minutes, reaching altitudes of 30-80 kilometers. This plume set up long-period oscillations in the atmosphere called Lamb waves that circled the Earth four times over six days. Lamb waves can be generated by any large pressure fluctuation near the surface. The Lamb wave coupled into the oceans and ground, causing ground tilt and fast tsunamis, the likes of which have not been observed since the 1883 Krakatoa and 1991 Mount Pinatubo eruptions. On the nearby island of Tonga, 70 kilometers away, day turned to night as the plume grew and ash fell from the sky. The shock wave from the eruption was felt in Tonga where peak overpressures were extrapolated to be 3 to 7 kilopascals, just below the threshold for injuries and structural damage. Sonic booms were audible as far away as Alaska.

Ash and gas plume rising from the Hunga Tonga–Hunga Ha'apai volcano one day before the January 15, 2022, eruption. Researchers from Lawrence Livermore National Laboratory and Los Alamos National Laboratory and their collaborators in academia and abroad used data from the event to test models and techniques used for nuclear explosion monitoring.

The 2022 Hunga Tonga–Hunga Ha'apai eruption was a global event recorded by all three Comprehensive Nuclear-Test-Ban Treaty Organization International Monitoring System geophysical sensor technologies: seismic, infrasound, and hydroacoustic. Large volcanic eruptions are rare and pheric nuclear tests in the 1950s and 1960s. The data collected from this 2022 eruption presented a rare opportunity to study signal propagation in the upper atmosphere with a modern global sensor network.

Nations generally test nuclear weapons at known test sites, but what if someone tried to hide a nuclear weapons test in an active volcano? After the Hunga Tonga–Hunga Ha'apai eruption, the Reuters and Agence France-Presse fact-checked claims made on social media that the eruption was a nuclear blast. Expert analyses and modeling from geophysical signals reveal that a volcanic caldera collapse mechanism was followed by multiple explosive events near the location of the volcano, with an estimated energy release from the eruption of 15 to 36 megatons of equivalent TNT. Datasets from the eruption provided an excellent exercise in data fusion (for nuclear explosions, additional data can come from atmospheric releases of radioisotopes or from satellite-based sensors), and are currently being used by national lab researchers sponsored by DNN R&D. Incorporating multiple data streams into an assessment mitigates limitations from any one sensor technology in nuclear explosion monitoring methods.

Gene Ichinose and Keehoon Kim are research geophysicists at Lawrence Livermore National Laboratory supporting multiple geophysical monitoring programs. John Lazarz is the DNN R&D Senior Program Manager for Ground-based Nuclear Detonation Detection.



Anti-symmetric Lamb wave illustration. Lamb waves in the Earth's atmosphere are primarily concentrated in the troposphere and propagate in the horizontal direction. Particle motion occurs in the direction of wave propagation as well as perpendicularly. They are excited by large events such as major volcanic eruptions and nuclear explosions.

Trees Record Nuclear Activities, Inked in Tritium

By Dr. Nicholas Luciano and Dr. Novella Bridges

Tritium is a radioactive isotope of hydrogen that is typically present at low levels in the environment, but it can be released during nuclear industrial processes. If the level of environmental tritium exceeds background concentrations, this may be an indication of nuclear activities nearby. The chemical behavior of tritium is practically identical to ordinary hydrogen, so tritium can be found as water, replacing an H in H2O, or in any number of organic compounds found in living organisms. Recently, research from Savannah River National Laboratory (SRNL) was featured on the August 2022 cover of the Royal Society of Chemistry journal "Environmental Science – Processes & Impacts" for their work measuring low levels of tritium in pine and oak tree cores around the Savannah River Site (SRS).[1]

A core sample is extracted from a tree at the Savannah River Site (SRS). Tree ring samples were analyzed for total tritium content and tritium chemical speciation.

The SRNL study correlated decades of tree ring measurements with known historical activities at SRS, while also examining the proportions of the different tritiated chemical species. Tree core analysis is used widely to examine changing climatological parameters such as temperature and precipitation, yet this was the first study to use modern chemical extraction methods for isolating tritium to investigate whether historical industrial tritium activities is recorded in trees. SRNL analyzed pines and oaks. Tree type is important because the wood structure in these types of trees helps preserve the environmental history of tritium exposure—unlike other trees with wood that does not adequately record such events.

The recently collected tree core samples used in the SRNL study contained tritium dated from 1960s , providing an opportunity to explore tritium in the environment over the last 70 years. The trace levels of tritium measured in the tree cores were consistent with the record of nuclear activities at SRS, ranging from the mid-1950s to the 1990s with a notable peak during the late 1960s when nuclear material production at the site was the greatest. The research team consists of early career scientists Elizabeth Pettitt and Holly VerMeulen, led by principal investigator Martine Duff. "The conventional thinking was that more tritium would be transpired to the atmosphere rather than retained in the wood structure," Duff stated. "Our data showed clear differences in tritium speciation due to atmospheric and surface water uptake."

Savannah River National Laboratory (SRNL) researchers collecting environmental samples at the SRS. Trace concentrations of tritium in environmental samples may be an indicator of nearby nuclear material production activities.

The results of this research have improved our understanding of how biological systems can record nearby nuclear fuel cycle activities, which not only have implications for nonproliferation, but also ecology and environmental remediation. "The SRNL team is providing vital and novel research to detect, locate, and characterize nuclear weapons material production," said Craig Sloan, Director of the DNN R&D Office of Proliferation Detection. This year the team plans to expand their research by examining other radionuclides in the environment, and reinforcing their partnerships with the University of Wisconsin, Madison and the University of Tennessee, Knoxville through two DNN R&D sponsored university consortia.

Dr. Nicholas Luciano is a DNN R&D staff nuclear engineer at Oak Ridge National Laboratory. He is currently on a management and oversight (M&O) assignment serving as a technical advisor for DNN R&D's Office of Proliferation Detection.

Dr. Novella Bridges is a senior program manager for DNN R&D's Office of Proliferation Detection. Previously, Dr. Bridges spent 18 years at Pacific Northwest National Laboratory (PNNL) and worked in two agencies within the Department of Homeland Security.

[1] *Pettitt, Elizabeth A., Martine C. Duff, and Holly VerMeulen. "Historical record of tritium from tree cores at the Savannah River Site." Environmental Science: Processes & Impacts 24.8 (2022): 1144-1151.*
DOI: https://doi.org/10.1039/D2EM00193D

Three Decades of HEU Minimization Cooperation with Kazakhstan

By Shannon Brown, Ashley Wiser, Brian Waud

After the collapse of the Soviet Union in 1991, Kazakhstan was left with significant inventories of former Soviet nuclear weapons and weapons-usable nuclear material. For the past 30 years, the U.S. Department of Energy (DOE) and Kazakhstan have worked cooperatively to secure and minimize inventories of highly enriched uranium (HEU) and plutonium to reduce the risk of weapons-usable nuclear material falling into the wrong hands.

The end of the Cold War presented new security challenges that the Cooperative Threat Reduction (CTR) program, also known as the Nunn-Lugar program, sought to address by securing and dismantling weapons of mass destruction and their associated infrastructure in the former Soviet Union. In 1994, after months of coordinated planning between Kazakhstan and the U.S. Government, DOE technical experts successfully packaged and removed approximately 600 kilograms of unirradiated HEU fuel from the Ulba Metallurgical Plant to the Y-12 National Security Complex.

In the years that followed, DOE and Kazakhstan continued to work cooperatively to address other large inventories of weapons-usable nuclear material in the former Soviet state. In 2010, after over a decade of cooperation, Kazakhstan and DOE's National Nuclear Security Administration (NNSA) completed the movement of ten metric tons of HEU and three metric tons of weapons-grade plutonium in spent fuel from the BN-350 nuclear reactor in Aktau to a new, secure, long-term storage facility at Baikal-1.

> ***"Our long-standing cooperation with Kazakhstan to minimize the use of weapons-usable nuclear material has made the world a safer place."***
>
> Corey Hinderstein, Deputy Administrator for Defense Nuclear Nonproliferation

In 2004, NNSA began working with Kazakhstan to convert research reactors from HEU to LEU and to repatriate Russian-origin HEU research reactor fuel. Work to convert the VVR-K and its Critical Assembly, located at the Institute of Nuclear Physics, to LEU fuel required redesigning the fuel as well as total replacement of the reactor and its control rod system to handle the new fuel. In 2012, the Critical Assembly was converted, with the VVR-K conversion completed in 2016.

At the same time, efforts were underway to design and fabricate a new LEU fuel to support conversion of the IVG.1M research reactor, located at Kazakhstan's National Nuclear Center (NNC). In 2020, The Office of Defense Nuclear Nonproliferation (DNN) and NNC downblended all remaining unirradiated HEU in Kazakhstan and in 2021, the irradiated HEU fuel was discharged from the IVG.1M reactor. The IVG.1M was successfully converted to LEU fuel in early 2022, and startup testing continues in 2023.

Through this cooperation, Kazakhstan successfully converted three of the four reactors from the use of HEU to LEU fuel and removed or downblended more than 210 kilograms of HEU from its VVR-K and IGR reactors—enough material for approximately eight nuclear weapons. The Office of Material Management and Minimization is also working with its partners in Kazakhstan on future downblending of excess irradiated HEU from the IGR reactor. DNN and NNC developed a new method to downblend the irradiated HEU graphite fuel and operations should start at the IGR site within the next few years.

Eliminating the need for weapons-usable nuclear material through the conversion of research reactors and removal, or downblending, of HEU and plutonium permanently reduces the risk of potential misuse. "Our long-standing cooperation with Kazakhstan to minimize the use of weapons-usable nuclear material has made the world a safer place," noted Corey Hinderstein, Deputy Administrator for Defense Nuclear Nonproliferation. DNN and its partners in Kazakhstan look forward to continuing to build upon this 30-year legacy of cooperation.

Shannon was a 2021 Minority Serving Institution Partnership Program (MSIPP) intern in the Office of Nuclear Material Removal (NA-232). She obtained her Bachelor of Science in Forensic Chemistry from Alabama State University and is pursuing a Master of Science in Chemistry at the University of Wisconsin-Madison. Ashley was an NNSA Graduate Fellow in the Office of Nuclear Material Removal (NA-232) and a former Air Force Minuteman III nuclear missile operations officer. She holds a bachelor's in History from the University of Iowa and a master's in International Relations from Troy University. Brian Waud is a Foreign Affairs Specialist in the Office of Conversion (NA-231).

Need for High Assay Low-Enriched Uranium Spurs DOE-wide Collaboration

By Peter Rocco

What material is a linchpin of the National Nuclear Security Administration's (NNSA) nuclear nonproliferation mission, might also hold the key to our clean energy future, and makes it sound like you're greeting an old friend when you say its name? High assay low-enriched uranium (HALEU). HALEU – pronounced "Hey, Lou!" – is uranium enriched between 5% and 20% U-235.

At and above the 20% enrichment threshold, uranium is defined as highly enriched uranium (HEU) and is considered a proliferation risk. Because of this risk, The Office of Defense Nuclear Nonproliferation (DNN) and its predecessors have spent decades working to modify or convert facilities to eliminate the need for, and production of, HEU in civilian applications. Since 1978, DNN has converted over 70 research reactors and isotope producers in the United States and internationally from using HEU to HALEU for their fuel and targets.

Broken Metal

As part of these conversion efforts and the Nuclear Non-Proliferation Act of 1978, DNN has a long-term commitment to these converted facilities to be a reliable supplier of HALEU. Currently, the United States does not have the capability to enrich above 5%, and HALEU for research reactors and isotope producers is provided by NNSA from a limited supply of HEU that is downblended below 20% enrichment.

The Department of Energy's (DOE) Office of Nuclear Energy (NE) also has a keen interest in the future of HALEU. The existing U.S. power reactor fleet runs on LEU enriched to approximately 5% U-235. However, many of the concepts for reactors of the future are considering higher assays approaching 20% to achieve smaller designs that get more power per unit of volume, allow longer life cores, increase efficiencies, and improve fuel utilization. Under the Energy Policy Act of 2020, Congress created the Advanced Reactor Demonstration Program to kickstart demonstration of these reactor technologies, as well as a HALEU availability program to support the availability of HALEU for civilian domestic research, development, demonstration, and commercial use.

Because of this shared interest in a reliable HALEU supply, numerous offices within DOE and NNSA have been coordinating to develop a DOE-wide uranium strategy. The ultimate goal is to incentivize private sector production of HALEU in sufficient quantities to meet the needs of both the government and commercial advanced reactors in the long term. In the short term, DNN is pursuing multiple avenues to provide limited amounts of HALEU from NNSA inventories for NE's advanced reactor demonstrations.

After extensive analysis, DNN identified up to 6.3 metric tons of HALEU that it can make available through multiple projects over the next several years for use in advanced reactor demonstrations. One project in partnership between the Y-12 National Security Complex and BWX Technologies to recover 2.2 metric tons of HALEU scrap material that had no previously identified use or available disposition path. In addition, DNN will make available some HEU to downblend for advanced reactors from its research reactor stocks and is pursuing projects to make HALEU available from material repatriated from a partner country. The HALEU resulting from these projects will be key to bridging the gap to the longer-term solution of U.S. HALEU enrichment and associated front-end fuel cycle capabilities.

Peter Rocco is a Foreign Affairs Specialist in the Office of Conversion. Prior to his time with the Office of Conversion, Peter worked in the Office of Nuclear Smuggling Detection and Deterrence.

Women in Strategic Trade Controls

By Daniel Johnson

On September 14, 2022, officials from the Office of Nuclear Export Controls and the Department of State's Export Control and Border Security (DOS/EXBS) program partnered with Singapore Customs to organize the first Women in Strategic Trade (WIST) seminar in Singapore. Approximately 100 in-person attendees and 10 virtual attendees, representing government officials from 10 Association of Southeast Asian (ASEAN) states, Australia, Germany, Japan, South Korea, the European Union (EU), the United Nations Office for Disarmament Affairs, and non-governmental experts from the EU and the United States, participated in the half-day event. The seminar achieved its objectives by sharing the experiences of several Southeast Asian women who have worked in national strategic trade management (STM) systems for over a decade. Speakers identified good practices that can be deployed in the coming months and years, highlighted the essential roles and contributions of women in STM, explored avenues for their professional development, and showcased their expertise to help recruit, retain, and train more women in this field.

ONEC facilitated all sessions throughout the event. Joy Ferguson, Program Director for ONEC's International Nonproliferation Export Control Program (INECP), moderated a session on Recruiting Women into Strategic Trade Management. The U.S. interagency also contributed to the event through participation and support of high-level representatives. At an opening reception hosted by the U.S. Embassy in Singapore, Casey Mace, Deputy Chief of Mission, welcomed the delegates and invited Ambassador Bonnie Jenkins, Under Secretary for Arms Control and International Security, to provide remarks on her experiences encouraging women in nonproliferation throughout her career. During the seminar, Kathryn Insley, Acting Deputy Assistant Secretary of State for International Security and Nonproliferation, provided remarks highlighting the importance of WIST and encouraged delegates to move the initiative forward and contribute to its success.

Under Secretary of State for Arms Control and International Security Bonnie Jenkins meets young women who work in export controls in Southeast Asia.

DNN's Joy Ferguson and Daniel Johnson join other USG participants during the WIST launch.

Following the kick-off seminar, INECP and EXBS will continue holding WIST events in the Southeast Asia region and globally expand the initiative, starting with a series of virtual and in-person activities. The long-term objectives of the engagements are to:

1. Highlight the essential roles and contributions of women in the management of strategic trade to help advance gender equity.

2. Facilitate increased representation of women in leadership positions and underrepresented areas of national strategic trade control systems.

3. Provide guidance and tools to partners on how to promote and facilitate gender equity.

By involving women in strategic trade, the network fostered by WIST will seek to build capacity and strengthen partners' strategic trade implementation, provide a forum to gather national and regional perspectives on current and emerging STM issues, and facilitate bilateral and regional programming. The second Southeast Asia WIST seminar will be held in October 2023 in Kuala Lumpur, in partnership with the Malaysian Strategic Trade Secretariat, an organization with strong female representation in leadership and a regional leader on strategic trade control.

Daniel Johnson is a Technical Advisor for NNSA's International Nonproliferation Export Control Program (INECP). He is responsible for managing bilateral and regional INECP programming in Southeast Asian countries.

CTBT Young Professionals Network Encourages Next Generation of Nuclear Explosion Monitoring and Verification Experts

By Tim Evans

The Comprehensive Nuclear-Test-Ban Treaty (CTBT) prohibits all nuclear explosions of any size and in any location, even underground. Although the Treaty is not yet in force, the United States and 185 other countries have signed it. Ensuring the continuous improvement and proper maintenance of the CTBT verification regime is the duty of staff at the Preparatory Commission for the CTBT Organization (CTBTO PrepCom), supported by U.S. and international experts.

Long term support for the CTBT requires a new generation of experts. The CTBT Young Professionals Network (YPN) was established in 2018 to encourage CTBT experts under 40 years of age to meet, discuss topics of mutual interest, and establish personal and professional connections. The dedication of these experts will enable the proper functioning of the CTBT's International Monitoring System (IMS) and the International Data Centre (IDC) into the future.

NNSA's YPN members are enthusiastic about their participation.

"YPN has provided unique insight into international expert opinions on technical developments and operational constraints."

-Dr. Michael Foxe of PNNL

"Discussing my recent research with the YPN generated many interesting questions and provided valuable feedback."

-Dr. Ana Aguiar of LLNL

"Being part of YPN exposed me to high-impact research happening outside the U.S. and is the perfect venue for fostering international collaboration."

-Ms. Sarah Albert of SNL

"I found the science talks to be useful as I learn about CTBT and the monitoring world."

-Dr. Chris Carr of LANL

NNSA's Office of Nuclear Verification supports nine NNSA experts as members of YPN. Despite limitations due to COVID-19, YPN members have been able to meet virtually and are now starting to meet again in person, such as at a recent CTBT Working Group B meeting in Vienna, Austria. NNSA's YPN members share their expertise about nuclear explosion monitoring and verification in the areas of radionuclide and waveform detection, specifically seismic and infrasound. These technologies not only enable the IMS and IDC to detect signs of low-yield nuclear explosions, but they also provide information and data useful to a number of civil and scientific applications as well. Tsunami warnings, civil aviation advisories, nuclear emergency response, and general scientific research all benefit from CTBT-related expertise.

Many of NNSA's YPN members met in Vienna in June 2023 at CTBT Science and Technology Conference 2023. NNSA will continue to amplify YPN's work and looks forward to expanding its support for the CTBT YPN and encouraging the next generation of arms control and nonproliferation experts.

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"We Rise By Lifting Others" Dave Huizenga's Legacy at DOE

By Jarret Fisher

Dave Huizenga spent decades ensuring dangerous governments and non-state actors were unable to acquire nuclear material for weapons. He is celebrated across the U.S. Government not only for his contribution to national security, but also as an extraordinary leader, team player, boss, and mentor. Huizenga retired from the federal government in January 2023 after 38 years of service, all within the Department of Energy (DOE). Huizenga remained at DOE because he "was always working on projects that benefited the nation, whether it was environmental cleanup benefiting local communities or nonproliferation work benefiting global security." Despite playing a key role in locking up nuclear materials across the former Soviet Union, and aiding negotiation and implementation of the Iran nuclear deal, Huizenga is most proud of having helped "young people grow and develop." Huizenga is grateful he was able to "hire, promote, and leave people in positions of authority."

Dave Huizenga, Senior Advisor for National Nuclear Security Administration at a retirement ceremony held on January 4, 2023. Photo credit: Donica Payne, DOE

His advice for young leaders is to "know where to find the smartest people. Do not try to do everything yourself and never pretend that you can. Let others shine; we rise by lifting others."

Huizenga's professional journey started when his mom and dad, who worked as a bank teller and manager at an auto parts factory respectively, gifted him a chemistry set as a child. By the time Huizenga reached high school, his goal was to become a park ranger with expertise in botany. During his freshman year of college, Huizenga discovered he was not good at memorizing botanical names and switched to chemistry. Upon graduation, Huizenga secured a job doing environmental chemistry at a paper mill. When he learned his peers were earning double his salary because they were chemical engineers and not chemists, he went back to school to earn a master's in chemical engineering.

Huizenga, a Michigan native, began his career in public service as an engineer at the Hanford Site in Washington state in 1985. Hanford is a decommissioned nuclear production complex that was central to the Manhattan Project. Huizenga was committed to responsible cleanup. Two years later, Huizenga's boss asked him to go to DOE headquarters in Washington, D.C. for a short detail. The National Environmental Policy Act (NEPA) Office needed coverage for three months. Huizenga never returned to his job at Hanford. He was effective and valued at NEPA, and met his future wife in the interim, who was not interested in moving out west.

In 1992, Huizenga moved to DOE's Office of Environmental Management (EM), whose mission is to address the nation's Cold War environmental legacy resulting from five decades of nuclear weapons production and government-sponsored nuclear energy research. The National Nuclear Security Administration (NNSA) was born in 2000, and Huizenga joined as the Deputy Director for the Office of International Nuclear Safety and Cooperation in 2002. His service has had a profound impact in shaping the NNSA having served as the Assistant Deputy Administrator for International Material Protection and Cooperation, Principal Assistant Deputy Administrator for Defense Nuclear Nonproliferation, Assistant Secretary for Environmental Management, Associate Principal Deputy Administrator of NNSA, Acting Secretary of Energy, Acting Deputy Secretary of Energy, Acting Principal Deputy Administrator of NNSA, and Senior Advisor to the Administrator during his 20 years at NNSA.

Huizenga continually rose in the ranks because he was a consensus builder and empowering manager. His approach to getting things done was to "build a team of people who want to get the job done and give them freedom to do the work." His advice for young leaders is to "know where to find the smartest people. Do not try to do everything yourself and never pretend that you can. Let others shine; we rise by lifting others." Huizenga believes the importance of staying calm as a leader cannot be underestimated; getting worked up will spread like wildfire and take energy away from the end goal. His parting advice for the next generation is to "find work you really believe in, that can make a difference in peoples' lives. Do different things throughout your career, do not get stale. Never give up when working on a tough project or policy, do what it takes to break through and get to where you want."