Office of Nonproliferation and International Security (NIS)

Fall 2012

Highlights

Fourth International Meeting on Next Generation Safeguards

DOE/NNSA together with the Vietnam Agency for Radiation and Nuclear Safety (VARANS) held the Fourth International Meeting on Next Generation Safeguards in Hanoi, Vietnam in early July.

Organized by NNSA's Next Generation Safeguards Initiative (NGSI) in collaboration with VARANS, the meeting brought together more than 80 experts from 27 countries, two regional inspectorates, and the International Atomic Energy Agency (IAEA) to discuss practical steps related to the implementation of international safeguards. International safeguards, a key component of the Nuclear Non-Proliferation Treaty (NPT), are a set of technical measures administered by the IAEA that provide credible assurance to the international community that nuclear material is not being diverted from peaceful purposes. In 2008, NNSA launched NGSI to develop the safeguards

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Important Milestone in U.S.-Russia Nuclear Security Partnership

HEU Purchase Agreement Surpasses 90% Completion Mark

BY GREG DWYER

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On September 28, 2012, NNSA completed its Transparency Monitoring Office (TMO) operations in Novouralsk, Russia. Established in 1996, the TMO has provided a long-term capability for U.S. technical experts to monitor the conversion of highly enriched uranium (HEU) from Russian nuclear weapons into low enriched uranium (LEU) at the Ural Electrochemical Integrated Enterprise (UEIE). Roughly half of all HEU-to-LEU

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

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Also In This Issue:

From the Editor: NIS strives to share information about our activities in a number of ways. Our periodic issues of *Highlights* represent just one outreach tool. We also post information on the NNSA Blog and issue an annual report. The best way to be sure you don't miss any updates from the program is to be on our electronic mailing list. Send a request to NISPublications@battelle.org and we will make sure you are on the list. We'll send you an e-mail and link when we post new information about our program.

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

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

For More Information:

Kasia Mendelsohn
Assistant Deputy Administrator
Office of Nonproliferation and International Security (NIS)
kasia.mendelsohn@nnsa.doe.gov
+1 (202) 586-2120

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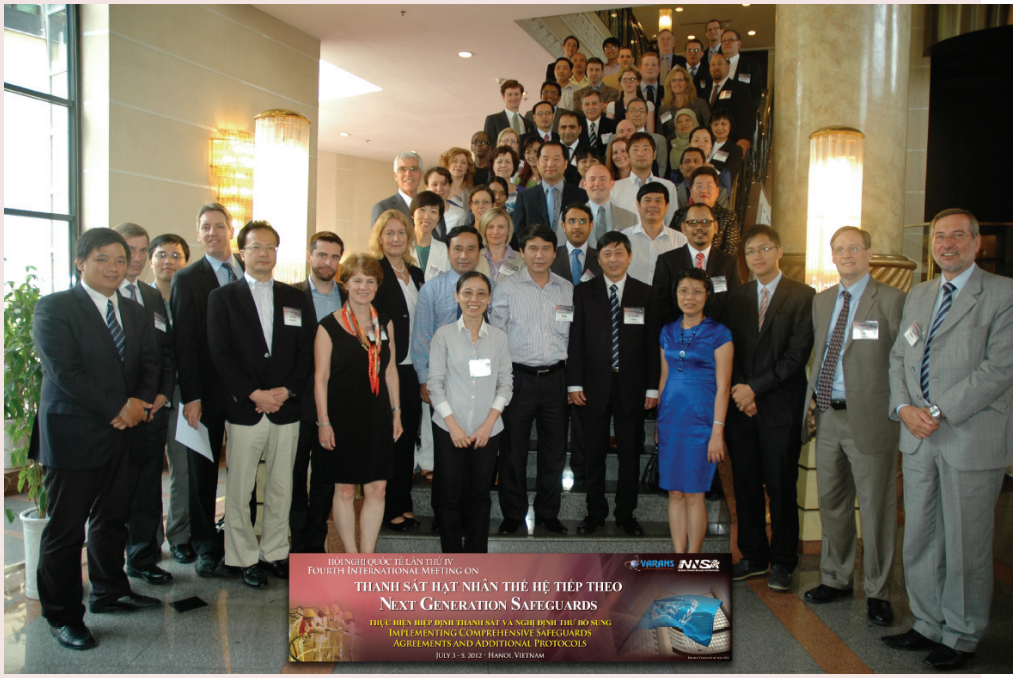

Participants in the Fourth International Meeting on Next Generation Safeguards.

policies, concepts and approaches, technologies, expertise and infrastructure necessary to strengthen and sustain the international safeguards system as it evolves to meet new challenges over the coming decades.

"The wide participation and commitment demonstrated by the international community to the importance of a strong international safeguards system demonstrates a shared interest in upholding the NPT and global nuclear security," said Deputy Administrator for Defense Nuclear Nonproliferation Anne Harrington. "NNSA will continue to explore new opportunities and partnerships in this area, which is central to the success of the international nonproliferation regime as well as implementing the President's nuclear security agenda."

This meeting provided a unique opportunity to

- Share lessons learned among IAEA Member States related to establishing and maintaining a State System of Accounting for and Control of Nuclear Material (SSAC).
- Exchange information on, and enhance understanding of, the role of SSACs and Safeguards Regulatory Authorities (SRAs) in the practical implementation of Comprehensive Safeguards Agreements (CSAs) and Additional Protocols (APs). SSACs and SRAs are the national entities responsible for collecting and reporting information about a country's nuclear program to the IAEA.
- Identify areas for mutual cooperation among workshop participants.

Because participants represented the broad spectrum of stages of nuclear development, from planning stages to full fuel-cycle capabilities, the meeting was designed to enable interaction. Topics included the legal and regulatory framework for effective safeguards, human resource development, and competencies needed for a strong system.

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Important Milestone - CONTINUED

conversion activities under the 1993 U.S.-Russia HEU Purchase Agreement are performed at UEIE. The closure of the TMO is the first step toward the full completion of U.S. transparency monitoring activities in Russia in 2013.

Between August 1996 and September 2012, the NNSA's HEU Transparency Program within NIS sent U.S. experts to the TMO on long-term (one to three month) monitoring assignments to observe HEU-to-LEU processing, conduct measurements confirming HEU enrichment levels, and review facility HEU processing documents. Now that the TMO is closed, the HEU Transparency Program will continue to perform these monitoring activities on six annual four-day monitoring visits to UEIE.

The TMO initially was staffed full time by U.S. experts to monitor the continuity of Russian HEU-to-LEU blending operations. However, following the 1999 installation of specialized U.S. equipment at UEIE—the Blend Down Monitoring System (BDMS)—TMO staffing was gradually reduced. The BDMS performs continuous, unattended measurements of the HEU-to-LEU blending process and is installed at two additional Russian facilities converting HEU to LEU. Today, the BDMS provides high-quality transparency monitoring data while saving taxpayer dollars and reducing the impact of U.S. monitoring in Russian facilities.

Under the 1993 Agreement, Russia agreed to convert 500 metric tons (MT) of weapon-origin HEU to LEU. That LEU is delivered to the United States where it is fabricated into nuclear fuel and is used in nuclear power plants to generate roughly 10 percent of all U.S. electricity consumed annually. Nearly half of all U.S. commercial nuclear energy comes from nuclear fuel derived from Russian nuclear weapons. As of 30 September, 463 MT of HEU has been converted to LEU by Russia. All 500 MT of HEU—the equivalent of roughly 20,000 nuclear weapons—is on track to be converted into LEU and delivered to the United States by the end of 2013.

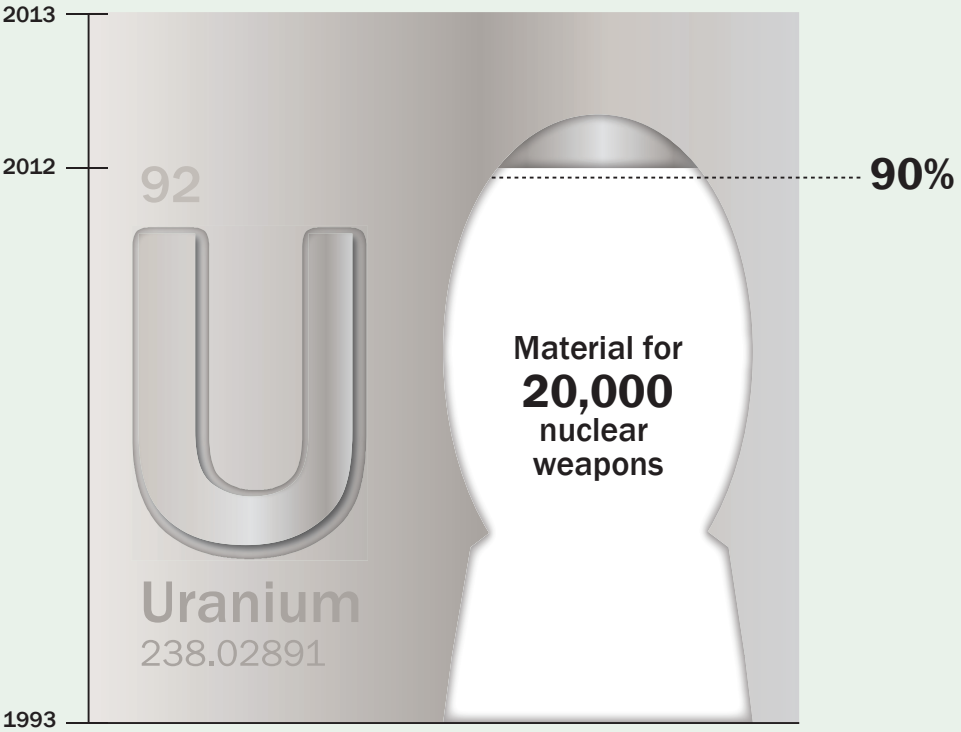
The 1993 Agreement contains transparency monitoring provisions to ensure that all LEU purchased under the Agreement is derived from dismantled Russian nuclear weapons and is used for exclusively peaceful purposes in the United States.

Argonne National Laboratory has provided technical support for TMO staffing and operations during the past 16 years. Additional U.S. TMO technical experts were drawn from numerous National Laboratories and contracting organizations. In addition to their monitoring work, TMO personnel engaged in humanitarian activities at local orphanages and clinics in and around Novouralsk.

The United States Enrichment Corporation and Techsnabexport are the respective U.S. and Russian executive agents responsible for the commercial implementation of the 1993 Agreement, which includes the purchase and transportation of LEU.

Gregory Dwyer is the team lead for the HEU Transparency Program within the NIS Office of Nuclear Verification. He is a graduate of the Monterey Institute of International Studies and has held various positions within NNSA since 2001.

HEU Transparency Program Surpasses 90% Completion



Conversion of HEU to LEU removes material that otherwise could have been used for nuclear weapons.

Next Generation Safeguards Initiative Attracts Young Professionals to Nonproliferation

BY EVAN WYSE AND LAURA WILLIAMS

One of many nonproliferation challenges currently facing the United States is human capital development—attracting, developing, and retaining the next generation of highly qualified and motivated professionals with the skills to sustain the U.S. nonproliferation mission over the coming decades. In the area of international nuclear safeguards, a 2010 Next Generation Safeguards Initiative (NGSI) study found that more than 80% of safeguards experts at the U.S. National Laboratories would leave the workforce in the next 15 years. Within NNSA, NIS has established special programs to attract new and mid-career staff with the right mix of technical and policy-oriented skills to support NNSA's nonproliferation mission. Since 2008, the NGSI Human Capital Development (HCD) subprogram has been working to attract, educate, train, and retain a new generation of safeguards and nonproliferation experts through university engagement, internships, short courses, graduate fellowships, professional development, and post-master's and post-doctoral fellowships. The NGSI internship program, which focuses on developing and equipping the next generation of safeguards professionals with the qualifications and experience to tackle emerging challenges facing the international nuclear safeguards regime, has since its inception supported over 400 internship positions at nine U.S. National Laboratories. Interns have represented over 80 universities, more than a third of interns have returned for a second internship, and more than one in five have converted to a permanent staff position.

Ross Snow, a former NGSI intern who now works at Oak Ridge National Laboratory, was finishing his master's in mechanical engineering when he accepted an NGSI internship. He says, "That internship completely reshaped what I wanted to do after I graduated. Nonproliferation is one of the first subject areas that I'm actually excited about." A key motivator for Ross is the opportunity to make a visible impact to America's national security. "I really enjoy the fact that I can see the direct impact of my work...it's very rewarding. Most engineers rarely get that opportunity."

Ross now studies the feasibility of adapting commercially available process monitoring technologies to meet International Atomic Energy Agency (IAEA) safeguards needs at gas centrifuge uranium enrichment plants. Effective safeguards allow the IAEA to increase the international community's confidence that nations have not diverted nuclear material for use in prohibited nuclear weapons activities. However, as gas centrifuge plants become increasingly complex, ensuring nuclear material is not diverted is a growing challenge. Ross explains, "Commercially available products have already been developed to address process monitoring needs in other industries, and offer a number of other features that might be attractive to the IAEA, like improved data reliability and security. This would translate both to better quality in the application of safeguards and savings for the taxpayer."

Pacific Northwest National Laboratory

Andrew Kurzrok formerly interned through the NGSI program and is now permanently employed at PNNL.

Another former intern, Andrew Kurzrok, came to Pacific Northwest National Laboratory (PNNL) to continue his research into effective nonproliferation outreach with companies that produce sensitive nuclear technology. While receiving his undergraduate degree in political science, Andrew developed an interest in nonproliferation through internships with the State Department at the U.S. Mission to the IAEA in Vienna and with the Stimson Center in Washington, DC. Over the course of his internship at PNNL, he was able to participate in intensive training sessions, tour nuclear facilities, and gain hands-on experience with many of today's nonproliferation tools.

Young Professionals

- CONTINUED

Andrew recently helped plan the 2012 Nuclear Suppliers Group (NSG) Plenary, which took place in June in Seattle, Washington. An international body made up of 46 Participating Governments, the NSG is a lynchpin in the international export control system that manages the spread of nuclear technology around the world. Andrew says, "It was fascinating to see diplomacy taking place in real time. The NSG Plenary only lasts for a week and our representatives from DOE, State, DOD, DOC, and NRC [U.S. Departments of Energy, State, Defense, and Commerce and the Nuclear Regulatory Commission] had to negotiate agreements around some deeply technical issues on-the-fly. Being exposed to that work was a tremendously rewarding experience." Andrew has recently been hired as a full time staff member at PNNL, and looks forward to tackling the next generation of nonproliferation challenges with the NIS team.

Continuing to attract and develop talented staff to work on international safeguards and nonproliferation programs will be an important element of long-term sustainability for NIS and its nonproliferation mission. Through training programs, mentorship opportunities, and internships such as these, NIS and its NGSI HCD program will continue to recruit young professionals capable of addressing proliferation challenges in the coming years.

Evan Wyse recently was hired as a research associate at PNNL, where he focuses on economic analysis and nonproliferation policy. Laura Williams is a senior nonproliferation specialist at PNNL with more than eighteen years of experience in arms control, nonproliferation, diplomacy, and communications.

NIS Welcomes EU CBRN Risk Mitigation Initiative

BY ROGER G. ANDERSON

The European Union (EU) has established a significant international program to mitigate chemical, biological, radiological, and nuclear (CBRN) risks through the creation of regional Centres of Excellence (COE). Launched in 2010, the EU COE program is designed to address the need to improve CBRN risk mitigation coordination at national and regional levels around the world. Thus far, the program has created five Regional Secretariats: African Atlantic Façade; Middle East; North Africa; South East Asia; and South East Europe, Southern Caucasus, Moldova, and Ukraine. Future expansion is planned to include Central Asia, Gulf Cooperation Council Countries, and Eastern and Central Africa. The EU Instrument for Stability funds the initiative with an estimated €95 M for the 2007-2013 period, and 19 projects are in development, addressing issues ranging from import/export monitoring to biological security. The COE regional networks are intended to become major vehicles for identifying and disseminating best practices in capacity-building for CBRN threat mitigation.

NIS already partners or intends to partner with the countries and regions that are covered by the EU program, which may provide a considerable opportunity for leveraging NIS investments. Key synergies between the NIS and EU programs are illustrated by several NIS programs and activities that will benefit from the establishment of the EU-funded COEs:

- The NIS International Nuclear Safeguards and Engagement Program (INSEP) conducts a wide variety of activities with partners around the world to reduce the likelihood of theft or diversion of nuclear materials for non-peaceful purposes; test new safeguards technologies; and prepare the safeguards infrastructure necessary to support the safe, secure, and peaceful uses of nuclear energy. With the support of U.S. National Laboratories, INSEP has concluded over 230 projects with international partners and has transferred a range of safeguards technologies to the International Atomic Energy Agency for use in advancing its safeguards mission. In addition to these activities, INSEP annually trains over 480 foreign practitioners on international and domestic safeguards. These activities have taken place in partnership with many national and regional institutions in the Middle East, Asia, South America, and North Africa.

- The NIS International Nuclear Security Program (INS) provides technical and capacity-building assistance to partner States interested in strengthening their physical protection and security infrastructures. INS conducts training in Africa, Latin America, the Middle East, and Southeast Asia.

  The continued engagement of INSEP and INS with new and established international partners at every stage of the nuclear fuel cycle can provide the basis for increased synergies with the EU CBRN COE program, including best practices for international nuclear safeguards and security and major participants in the development of new practices in those areas.

- The NIS International Nonproliferation Export Control Program (INECP) strengthens global efforts to prevent the proliferation of materials, equipment, and technology used to manufacture weapons of mass destruction

EU Centres of Excellence , Page 6 ...

by strengthening national export control and related border security systems. INECP addresses both State and non-State actor acquisition of CBRN-related materials through training tailored for each partner. INECP plays a pivotal role in U.S. Government efforts to develop technically informed capacity-building approaches to proliferation threats through activities such as the Weapons of Mass Destruction (WMD) Commodity Identification Training (CIT) course which has been deployed globally and the program's Cooperative Border Security System Management workshop curriculum. As with INSEP and INS, INECP will be a principal source of best practices that can be disseminated through the regional COE system being developed by the EU CBRN program.

The EU CBRN COE program was established to implement EU policies and needs; address lessons learned from past EU programs such as Technical Aid to the Commonwealth of Independent States (TACIS) and ongoing international assistance programs; and reflect EU Member States' and industry standards, guidelines, and norms. It is clear, however, that the EU program is designed to counter many of the same CBRN threats that the U.S. NIS programs address. Moreover, both EU and U.S. initiatives share a desire to work effectively across national, regional, and international institutional landscapes and to use their respective resources in the most effective manner possible. In times of increasingly constrained budgets in the EU and the United States, potential synergies also can translate into substantial savings and the ability to do more with limited budgets. Capturing these synergies will require close coordination to avoid duplication of effort while facilitating the identification and deployment of best practices and lessons learned. The opportunity to increase international capacity to identify and mitigate CBRN threats and leverage investments made by the United States and Europe is a welcome new development.

Roger Anderson is a Principal Advisor in PNNL's National Security Directorate, having returned in 2011 from a five-year resident assignment to the United Kingdom, where he served as Director of Strategic Business Development for the UK National Nuclear Laboratory. His focus is on sustainable capacity building for science and technology institutions.

Pacific Northwest National Laboratory

Participants from an INECP workshop held at the Middle East Scientific Institute for Security (MESIS), an independent nongovernmental organization (NGO) in Amman, Jordan. The MESIS director was recently appointed as the first rotating head of the EU CBRN COE Middle East Regional Secretariat. MESIS has served as a primary NGO partner in INECP training courses and INSEP workshops.

U.S. and UK Conclude Warhead Monitored Dismantlement Exercise

BY MICHELE SMITH

Early in fiscal year 2012, the United States and the United Kingdom completed a significant 18-month Warhead Monitored Dismantlement Exercise under the 1958 U.S.-UK Mutual Defense Agreement. It concluded with a formal "wrap-up" and lessons learned meeting in December 2011. The exercise built on and adds to the body of research and analysis that has been acquired through more than a decade of U.S.-UK cooperation on arms control and nonproliferation matters, led by the NIS Office of Nuclear Verification.

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

The exercise scenario focused on two fictional countries with nuclear weapons: Avalonia (played by the United Kingdom) and Tachonia (played by the United States). The countries negotiated an Agreement and Protocol which contained the basic provisions for mutual nuclear weapons reductions that would be accomplished through monitored dismantlement. Avalonia's first nuclear device dismantlement was to be monitored in 2011.

The monitored dismantlement was performed in an operational nuclear facility and was of a representative nuclear device with fissile material and simulated high explosives. Exercise planning began in July 2010 with exercise activities taking place throughout 2011. Activities included: monitoring regime scope discussions and negotiations, a familiarization visit, Joint Chain of Custody (CoC) Working Group meetings, Joint Nondestructive Assay (NDA) Methods Working Group meetings, and the November 2011 Monitoring Visit.

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

- Providing for less notional monitoring and verification elements than previous joint exercises to allow for a more realistic understanding of the challenges and issues involved,
- Negotiating the Agreement and implementing documents, including specific dismantlement monitoring procedures,
- Testing of new and existing equipment and methodologies,
- Developing successful methodologies to address key aspects of monitored dismantlement,
- Generating framing documents that can be used in future exercises,
- Identifying technology areas where a significant amount of work is still needed, and
- Identifying technologies and methodologies for further development.

U.S.-UK activities such as the Warhead Monitored Dismantlement Exercise demonstrate clearly that exchanges improve scientific and technological abilities that can support existing and future arms control and nonproliferation initiatives, including the negotiation of new agreements. Lessons learned from U.S.-UK work show that countries can successfully collaborate on sensitive technical disarmament and verification topics. The exercise also demonstrated that a well managed technical collaboration can facilitate:

- Increased understanding for protecting classified and sensitive information,

Exercise, Page 8 ...

Exercise - CONTINUED

- Determining the technologies, skills, and techniques that are available and can be used to effectively monitor the nuclear weapons reduction process,
- Expanding the technical and procedural knowledge base for warhead dismantlement and transparency, as well as monitoring methods in general, and
- Gaining real-world experience using the potential methods and technologies available.

A clear lesson learned from the exercise is that the "devil is in the details." In addition, while significant resources were applied to support the exercise, they were still overstretched for addressing the complexities of dismantlement verification. Implementing a warhead dismantlement regime requires resolution of many difficult classification, access, technology and legal challenges, which require foresight, preparation and ingenuity to overcome, not to mention resources. It is also clear that there are possibilities for creative approaches to support monitoring and verification, even in some of the most sensitive and challenging operational environments.

Michele Smith is the Deputy Director for Warhead and Fissile Material Transparency in the NIS Office of Nuclear Verification. She is a nuclear engineer who has been with DOE for 22 years and has held various positions within her current office for 16 years.

Next Generation Safeguards - CONTINUED FROM PAGE 2

Kevin Veal and Matthew Van Sickle represented NIS at the Fourth International Meeting on Next Generations Safeguards.

Kevin Veal is the Director of the NIS Office of Safeguards and Security, which is responsible for NGSI. Veal has a doctorate in nuclear physics from the University of North Carolina at Chapel Hill, and before joining NIS spent 11 years with Los Alamos National Laboratory in the Safeguards Science and Technology Group.

Matthew Van Sickle joined NIS in 2006 as a Nonproliferation Graduate Fellow and has served as a program manager for nuclear safeguards and nonproliferation projects in the Middle East, North Africa, and Southeast Asia. Van Sickle holds master's degrees in international studies and public affairs from the University of Washington.

WHAT ARE CSAs AND APs?

The IAEA has made clear that Comprehensive Safeguards Agreements (CSAs) and global implementation of the Model Additional Protocol (AP) constitute what is needed for effective safeguards verification among Member States. Since 1997, the AP has served to strengthen nuclear safeguards systems by increasing the IAEA's ability to provide credible assurances of the absence of undeclared nuclear activities. An AP is supplemental to any existing safeguards agreement and provides for more information to the IAEA, greater IAEA access, and streamlined administrative processes.

When a State has both a CSA and an AP in force, it better enables the IAEA to provide credible assurances to the international community of both the absence of undeclared nuclear activities and that declared materials remain in peaceful nuclear activities.