

Exceptional service in the national interest



SNL Safeguards Overview

Risa Mongiello

International Safeguards and Technical Systems

November 2012

Image Source: IAEA Image Bank



Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2012-XXXXP

Outline

- SNL International Nuclear Safeguards Cooperation
 - Bilateral Cooperation with Latin America, East Asia and Europe
 - Support to IAEA
- Conclusion

Cooperation: Expertise in Critical Aspects of International Safeguards

- **Equipment and Information Security**
 - Safeguards authorities must be able to trust the information it collects and ensure it is suitably protected.
 - Key elements: authentication, encryption, tamper indication and system design
- **Remote and Unattended Monitoring**
 - IAEA increasingly relies on information collected by unattended safeguards instruments at facilities worldwide
 - With proper security, much of the information can be communicated to the IAEA remotely by internet, satellite, or telephone
- **Vulnerability Assessments (VA)**
 - Before technologies and systems can be certified for routine Safeguards use, they must survive rigorous independent testing
- **Containment and Surveillance (C/S) technologies**
 - Safeguards relies heavily on maintaining “Continuity of Knowledge”
 - C&S technologies indicate tampering with nuclear materials or processes

SNL Contributions to International Nuclear Safeguards (continued)

- Onsite Inspection and Managed Access
 - Readiness procedures and host/inspector training
- Geological Repository Safeguards
 - Containment and surveillance methods are essential to the safeguards approach for geological repositories
 - Seismic detection, satellite imagery and other technologies can assure the integrity of a repository isolation zone
 - SNL has experience with the Waste Isolation Pilot Plant (WIPP) and Yucca Mountain repositories
- Other
 - Extensive science and engineering base: Subject matter expertise for a variety of disciplines relevant to Safeguards, including chemical analysis, materials science, cryptography, and many others

Outline

- SNL International Nuclear Safeguards Cooperation
 - Bilateral Cooperation with Latin America, East Asia and Europe
 - Support to IAEA
- Conclusion

Bilateral Cooperation: South America

Cooperation

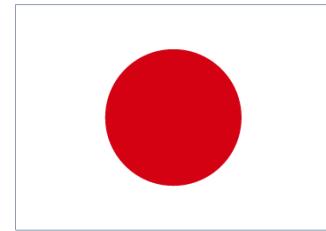
- **Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC)**
 - (AS-18) Develop and deliver a video surveillance system to support unannounced inspection. Follow-on work under consideration.
 - (AS-23) Support for inspector training in C/S measures.
- **Autoridad Regulatoria Nuclear (ARN)**
 - (AS-11) Secure communications for nuclear regulatory network; further potential collaboration under discussion



- **Comissão Nacional de Energia Nuclear (CNEN)**
 - (AS-17) Work with CNEN on secure data communications
 - (AS-22) Assessment of antineutrino monitoring of reactors for safeguards

Bilateral Cooperation:

East Asia



- [Japan](#)
 - Japan Atomic Energy Agency (JAEA)
 - (AS-65, completed) Regional cooperation in remote monitoring: a secure link between SNL and Joyo was established, upgraded, and maintained
 - PAS16: Information Sharing Framework for Regional Nonproliferation Cooperation
- [Republic of Korea](#)
 - Korea Atomic Energy Research Institute (KAERI) and Korea Institute of Nuclear Nonproliferation and Control (KINAC)
 - (AS-12, completed) Regional cooperation in remote monitoring: secure link between SNL, Idaho National Laboratory, and KAERI was established
 - AS26: Information Sharing Framework for Regional Nonproliferation Cooperation
 - Collaborative work with ROK on geological repository safeguards under discussion.

Bilateral Cooperation:

Europe



- [Euratom](#)
 - (AS-20) Wireless Data Collection – tested the security of various communication links in collaboration with the European Joint Research Centre (JRC)
 - (AS-30) SNL and JRC surveyed 3D sensing technologies for application to Safeguards
 - (AS-41) Enhanced Data Authenticity – Demonstrate authentication of branching operator process instrumentation to meet implementation requirements.
- [France](#)
 - Separate agreements with the Commissariat à l'Énergie Atomique (CEA) and the Institut de Radioprotection et de Sûreté Nucléaire (IRSN)
- [European Safeguards Research and Development Association \(ESARDA\)](#)
 - Observers to ESARDA working groups: Containment and Surveillance, Safeguards Implementation, Verification Technologies & Methodologies
 - Attendance and contribute papers at annual meetings of ESARDA

Outline

- SNL International Nuclear Safeguards Cooperation
 - Bilateral Cooperation with Latin America, East Asia and Europe
 - Support to IAEA
- Conclusion

Direct support to IAEA Department of Safeguards: Supplementing Regular Budget

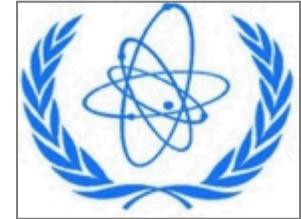
- IAEA extra-budgetary contributions - Member State Support Programs (MSSP)
 - MSSPs do not conduct routine Agency business
 - Specialized tasks and technology development
 - Cost-free experts
- U.S. Program of Technical Assistance to IAEA Safeguards (POTAS)
 - Oversight:
 - Subgroup on Safeguards Technical Support (SSTS)
 - Members: DOE and other U.S. agencies (NRC, DOS, DOD)
 - Administration: International Safeguards Project Office (ISPO), Brookhaven National Laboratory
 - Funding: U.S. Department of State
 - Technical support provided by government, contractor, and commercial providers in response to IAEA-initiated requests

SNL Technical Support to IAEA

- Cost Free Experts
 - Keith Tolk (2000 – 2005)
 - Joe Damico (2002 – 2007)
- Technical Development
 - Remotely Monitored Sealing Array (RMSA)
- Vulnerability Assessments
 - Ultra Sonic Sealing Bolt (USSB)
 - Electronic Optical Sealing System (EOSS)
- Meetings/ Consultancies
 - Applications of Safeguards to Geological Repositories (ASTOR)
 - Ad-hoc Expert Advisory Working Group on Antineutrino Monitoring for Safeguards

POTAS-Funded Support to IAEA: Response to IAEA Requests

- POTAS task process:
 - IAEA issues “SP-1” request for proposal
 - ISPO relays request to potential technical organizations
 - U.S. National Laboratories
 - Commercial providers
 - If appropriate, SNL assembles team to develop/submit a proposal
 - ISPO, IAEA and the SSTS review/decide on proposal to accept



If SNL’s proposal is accepted:

- Work for Others Interagency Agreement established
- Project is funded/started
- Quarterly reports to ISPO
- Monthly financial status updates

Remotely Monitored Sealing Array (RMSA)

- Active loop seal for IAEA Safeguards application
 - Seal integrity and status reported via authenticated/encrypted wireless transmission to a central “translator”
 - Seals units are optimized for low power consumption and last 4-5 years on battery without replacement
 - Plastic fiber optic seal cable is easy to install and terminate
 - Incorporates advanced tamper indication and communications capabilities
 - Low life-cycle cost
- Task is coordinated jointly with Canberra (manufacturer)
- SNL Principal Investigators:
 - Ross Hymel
 - Maikael Thomas

RMSA
pre-production
prototype



Outline

- SNL International Nuclear Safeguards Cooperation
 - Bilateral Cooperation with Latin America, East Asia and Europe
 - Support to IAEA
- Conclusion

Conclusion

- International nuclear safeguards = key component of NPT regime
- Objective: Prevent diversion of nuclear materials to weapons through accountancy, protection, C/S and control.
- SNL bilateral cooperation strengthens international safeguards by:
 - Leveraging the development of safeguards technologies and systems
 - Demonstrating technologies of potential interest to the IAEA
 - Transferring safeguards skills to bilateral partners
 - Maintaining direct technical contact with the international safeguards community
- SNL direct support of the IAEA through POTAS promotes improved implementation of safeguards
 - Responds to IAEA needs on specific technologies
 - Stimulates growth of the IAEA technical base

Questions?