Summary

- International safeguards are a key pillar of the global nuclear nonproliferation regime.
- The international safeguards system is under increasing strain due to a fundamental imbalance between workload and resources.
- U.S. is working with partners around the world to sustain the international safeguards system as it evolves to confront current and future challenges.
Challenges

**Workload**
- Global nuclear renaissance
- Growing safeguards burden
  - Number of facilities
  - SQs of material
- Evolving mandate
  - Investigation of undeclared activities
  - Proliferation networks

**Resources**
- Static IAEA budget and staffing levels
- Attrition among safeguards professionals both at IAEA and in the United States
- Loss of critical facilities and infrastructure
U.S. Perspective

Nuclear energy expansion will place increasing strain on the international safeguards system

- Countries with Nuclear Power
- Countries Considering Nuclear Power
Global Nuclear Expansion…

Global Nuclear Power Generating Capacity
(IAEA projections)

GW(e)


+100 %

+30 %
Impact on Safeguards

Total nuclear reactors under SG in NNWS

Impact on SG of nuclear power projections in NWS not included
Facilities under SG in all States:

2009: 133 (12 in NWS)
2030: 160
Impact on Safeguards (cont)

Nuclear Material under SG

+50% in the last decade

SIR Data
New facilities, materials, Additional Protocol reporting, and demands in Iran, North Korea and India place huge strains on IAEA resources and safeguards credibility.
Evolving Proliferation Threat...
Resource Constraints…

IAEA Safeguards Budget Over Time

Budget in 2008 dollars

$\text{Budget in 2008 dollars}$

$-$

$-$


Resource Constraints (cont)…

At the IAEA…

• 35-40% of inspectors and senior staff expected to retire by 2014

… And in the United States –

Safeguards Staffing Historical Overview
(Figures drawn from LLNL, LANL, SNL)
Fundamental Review

- Bottom-up review of safeguards:
  - Authorities
  - Technology
  - Human Resources
  - Financial Resources

- Key recommendation:
  “Launch a Next Generation Safeguards Initiative to strengthen safeguards policies and institutions, coordinate U.S. safeguards research and development, and revitalize the safeguards technology and human capital base.”
Next Generation Safeguards Initiative

- Goal is to take measures in cooperation with international partners to sustain the international safeguards system as its mission evolves over the next 25 years
  - Policies
  - Concepts
  - Technologies
  - Expertise
  - International Engagement
- Drafted five-year program plan
GOAL 2: Support U.S. safeguards policy development and work bilaterally and multilaterally to strengthen the international safeguards system as an essential element of the global nuclear nonproliferation regime.

- **Objective 2.1**: Strengthen and encourage the use of existing IAEA authorities and examine possible new authorities.

- **Objective 2.2**: Support the adoption of technically sound safeguards approaches, especially planning, implementation, and evaluation of State Level Approaches.

- **Objective 2.3**: Strengthen the IAEA and the mechanisms through which the United States provides support to the IAEA.

- **Objective 2.4**: Increase public awareness and understanding of international safeguards.
NGSI Program Plan: Policy Development & Outreach Projects

- Review existing and possible new authorities (2.1)
- Promote universal adherence to / implementation of existing authorities (2.1)
- Review information and other bases of safeguards conclusions (2.2)
- Review options for strengthening state-level approach (2.2)
- Review the U.S. and international organizational structures that support safeguards (2.3)
- Review IAEA safeguards budget and extrabudgetary requirements (2.3)
GOAL 3: Develop advanced safeguards concepts, approaches, and assessment methodologies to enhance the effectiveness, efficiency and credibility of international safeguards.

- **Objective 3.1:** Demonstrate and institutionalize “Safeguards by Design.”

- **Objective 3.2:** Develop facility-specific safeguards approaches, incorporating process monitoring when possible.

- **Objective 3.3:** Support adoption and acceptance of implementation of IAEA State Level Safeguards Approaches and integrated safeguards.

- **Objective 3.4:** Develop, demonstrate, and evaluate the “enabling concepts” for advanced safeguards approaches.
NGSI Program Plan: Concepts and Approaches Projects

- Institutionalize “Safeguards by Design” (3.1)
- Develop safeguards approaches for specific facilities (3.2)
- Systems studies to support the implementation of State Level Approach (3.3)
- Process monitoring of complex fuel cycle facilities (3.4)
- Facility computer modeling and simulation (3.4)
- Proliferation Risk Assessments (3.4)
GOAL 4: The goal of the safeguards technology development program is to strengthen international safeguards through the development and application of tools, technologies, and methods that optimize the effectiveness and efficiency of safeguards at both the facility and state levels.

- **Objective 4.1**: Develop advanced tools and methods to detect diversion of declared nuclear materials.

- **Objective 4.2**: Develop advanced tools and methods to detect undeclared production or processing of nuclear material.

- **Objective 4.3**: Provide information analysis solutions to improve state level assessments.
NGSI Program Plan: Technology Projects

- Spent fuel NDA assessment (4.1)
- Enrichment monitoring (4.1)
- Process monitoring (4.1)
- Containment / surveillance tools and methods (4.1)
- Data integration / authentication (4.1)
- In-field sample screening and analysis (4.2)
- Network of Analytical Laboratory support and qualification (4.2)
- Continued support via USSP for IRP, nVision (4.3)
- Survey of standards, infrastructure needs (4.5)
GOAL 5: Revitalize and expand the international safeguards human capital base in the United States by attracting and training a new generation of talent.

- **Objective 5.1:** Develop and implement a human capital management strategy to attract, develop and retain international safeguards technical staff at U.S. national laboratories and industry.

- **Objective 5.2:** Increase the total of number U.S. experts applying for safeguards positions at the IAEA, but, more importantly, increase the number who are ranked as “well qualified” in the selection process.

- **Objective 5.3:** Build international consensus support for evolving IAEA personnel policies to better take advantage of existing pool of experts.
NGSI Program Plan: Human Resource Development Projects

- Staffing Study (5.1)
- Career Paths (5.1)
- Outreach Plan (5.1)
- Education and Training (5.1)
- Professional Development (5.1)
- Recruitment (5.2)
- Laboratory Policies (5.2)
- Interagency Support (5.3)
NGSI Program Plan: International Engagement

**Goal 6:** Help establish and strengthen effective SSACs that can provide timely and reliable safeguards information to the IAEA.

- **Objective 6.1:** Assist states in developing legal frameworks, regulatory structures and operational best practices.
- **Objective 6.2:** Assist states in developing safeguards technical capacity, including improvement of national safeguards authority, facility level capabilities and implementation of the AP.
- **Objective 6.3:** Assist states in developing sustainable and effective human resource systems that support the implementation of safeguards.
- **Objective 6.4:** Work with IAEA and international partners to respond to safeguards technical challenges in foreign facilities.
NGSI Program Plan: International Engagement

- Regional and bilateral legal and regulatory assistance workshops (6.1)
- AP and SSAC Implementation Assistance (6.2)
- Regional Human Resource Development Workshops (6.3)
- Continue Bilateral Safeguards Cooperation with Argentina, Brazil, ABACC, EURATOM, China, Japan, Republic of Korea, and South Africa (6.4)
International Engagement: Technology Development

- Develop more efficient and effective international safeguards by improving state of the art technology
  - Advanced tools and methods to detect diversion of declared nuclear materials

- International collaboration beneficial
  - Leverage valuable expertise and experience of international partners
  - Testing and evaluating technology developed in non-U.S. facilities
International Engagement:
Technology Development

- NNSA has a number of international safeguards technology development partners including:
  - Brazil
  - ABACC
  - China
  - Argentina
  - Japan
  - Euratom
  - South Korea
  - France
Examples of International Collaboration on Safeguards Technology Development

- **Brazil:**
  - Joint Testing of UF6 Cylinder Tracking Technologies in Brazilian Facilities

- **China:**
  - Cooperation on the Development of Safeguards Approaches for the Pebble Bed Modular Reactor

- **South Korea:**
  - Cooperation on the Development of Safeguards Technology and Approaches applicable to an advanced fuel cycle

- **Japan:**
  - Cooperation on the Development of Safeguards Technologies and Approaches for:
    - Tokai and Rokkasho Reprocessing Plants
    - Rokkasho and Ninyo-toge Enrichment Facilities
    - Monju Fast Breeder Reactor
    - JMOX Plant
International Engagement: Joint Training in Third Countries

• Mission:
  – Provide safeguards infrastructure support to countries with credible plans for nuclear power

• Vision:
  – Cooperate with international partners through technical engagement projects to develop the safeguards infrastructure necessary for safe, secure and peaceful nuclear power programs
International Engagement:
Joint Training in Third Countries

- Areas of Technical Collaboration:
  - Nuclear Legislation and Regulatory Development for Safeguards
  - Strengthening SSAC and Safeguards Implementation
  - Additional Protocol Implementation
  - Human Resources Development
- Promoting Best Practices:
  - Reactor operations
  - Radiation protection
  - Quality assurance and quality control
  - Low level radiation waste minimization and handling
  - Environmental radiological monitoring
  - Emergency management
Harmonization

• NGSI is working with international partners to coordinate training assistance provided to newcomer countries.

• Two harmonization meetings have been held in Vienna (April 2009, February 2010).

• Website developed to facilitate coordination and information sharing.
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