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The International Atomic Energy Agency-The Global Guardian of Nonproliferation

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The International Atomic Energy Agency - The Global Guardian of Nonproliferation

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What I am going to talk about

- The International Atomic Energy Agency
- No law enforcement only diplomatic persuasion based on verification activities
- “Law enforcement” by the United Nations Security Council
- IAEA depends on its safeguards technology to give it credibility in its verification role
- Its Technology is similar and different from that in counterterrorism and homeland security area, but these activities have caused a new technology push that IAEA may benefit from.

The International Atomic Energy Agency is a U.S. Invention

- President Eisenhower proposed creation of the International Atomic Energy Agency in 1953 in his famous Atoms for Peace speech.
- He proposed it because he believed U.S was not credible guardian for world nuclear materials
- Along with USSR (and others), U.S. set up the IAEA, its mandate, and its rules in its Statute, an international treaty.
- International Community gave IAEA independent authority to verify that countries do not use their peaceful nuclear activities to make nuclear weapons.

The U.S. Interagency Players

- Department of State – USG policy lead, national security export controls
- Department of Energy – USG technical lead, nuclear technology export controls
  - DOE labs
- Nuclear Regulatory Commission – policy; nuclear material, facilities, and equipment export controls
- Department of Defense – policy; with DOS - export controls
- Department of Treasury – economic sanctions
- Department of Commerce – dual use export controls
- All support IAEA objectives, which are U.S. national security objectives

The Nuclear Non-Proliferation Treaty

- A principal instrument from which IAEA derives its nonproliferation authority - Nuclear Nonproliferation Treaty of 1970
- Created non-nuclear weapons states and nuclear weapons states – U.S., USSR, France, UK and China*
- Resulted in Non-NPT states – Israel, India, Pakistan and later North Korea
- NPT Article III – how IAEA verification, that is, its safeguards, can be implemented
- Countries placed limits on safeguards implementation due to national sovereignty, proprietary information, and classified technology.
- * Different agreements on safeguards with IAEA

Article III of the NPT - Safeguards

- Each Non-nuclear-weapon State Party to the Treaty must accept IAEA safeguards and conclude agreement to do so with IAEA
- Safeguards are for exclusive purpose of verification of country's obligations under NPT and agreement
- IAEA verification to prevent diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices.
- Safeguards applied on all source or special fissionable material in all peaceful nuclear activities within country, under its jurisdiction, or carried out under its control anywhere.

Article III Details

- NO State Party will provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for processing, use or production of special fissionable material to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material is subject to safeguards
- Special fissionable material defined – uranium and plutonium; now expanded
- Specially designed equipment – concern - enrichment and reprocessing

Article III details – Safeguards Cannot

- Safeguards cannot interfere with countries "inalienable right" to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with no nuclear weapons commitments under Articles I and II of NPT. IRAN
- Safeguards cannot hamper economic or technological development of Parties or international co-operation in the field of peaceful nuclear activities, including international trade in nuclear material and equipment for peaceful purposes.
  - Can't just show up to inspect

Constraints on IAEA Safeguards

Countries constrain what IAEA can do:

- Single entry visas vs. multiple entry
- Limited access to certain facilities due to proprietary concerns
- Limited access because “not ready” for inspector; concern that safeguards interfere with economics
- Refuse to agree to inspector from a specific country
- Country has to agree that technology used is accurate and provides valid technical information
- IAEA Inspectors must be Diplomats: s/he must ask to view declared facility, ask about something country told her/him, ask about something s/he read, ask to see an undeclared facility; can’t just go anywhere want.
- Safeguards work best when country cooperates with IAEA.

IAEA Safeguards = Verification

- To maintain confidence in nuclear non-proliferation, IAEA's safeguards must convincingly deter proliferation through early detection of potential misuse of peaceful nuclear programs and provide credible assurances of countries' compliance with their commitments to use nuclear material and facilities solely for peaceful purposes.
- IAEA safeguards assess correctness and completeness of country's national nuclear material accounting and control system; backed by use of IAEA's containment and surveillance measures.

Evolution of Safeguards

Iraq, DPRK, Iran, and Syria effect safeguards

- 1991-2 Persian Gulf War – exposes Iraq's WMD programs
- 1992 – Nuclear Suppliers Group – dual use technology controls because of Iraq
- 1993 – IAEA request special inspection in DPRK, DPRK refuses, UN Security Council condemns
- 1993-4 – US-DPRK agreement and KEDO reactor
- 1995-7 - Additional Protocol to enhance IAEA safeguards authority

Safeguards Evolution

- 2002 - Iran program outed
- 2003 – DPRK leaves NPT, Iraq War II, Iran agrees to sign Additional Protocol, but not ratify
- 2005 – Iran resumes enrichment; refuses to continue “voluntary” Additional Protocol implementation
- 2006 – First UN Security Council Resolution demanding Iran stop enrichment
- 2006 – DPRK first nuclear weapons test

Safeguards Evolution

- 2007 – DPRK agrees to new agreement with China, France, Russia, US, UK and European Union; dismantlement of some of its nuclear facilities
- 2007 - Israel bombs facility in Syria
- 2008 – IAEA environment samples from Syria contain uranium
- 2009 – Second DPRK weapons test
- 2011 – IAEA declares Syrian facility was reactor

IAEA Verification Tools

- Surveillance using IAEA's own camera/video systems
- Containment – IAEA seals from metal to RF, tamper-safe technology
- Rad and nuke detectors, other chemical element detectors, spectrometers, scales; onsite sampling

POST IRAQ With ADDITIONAL PROTOCOL

- Open source data collection and management
- Satellite pictures
- Offsite sampling
- Unannounced inspections
- Request access to undeclared facilities anywhere in country

IAEA Safeguards Technology

- Where does IAEA gets its technology? Primarily through governments
- U.S. funders: U.S. Support Program thru International Safeguards Project Office (State Dept); National Nuclear Security Administration, NA-22, NA-24; State Department
- Export control limitations – International Trade in Arms Regulations; dual use technology, e.g., computers, encryption, high tech materials, certain electronics
- Some cross tech use with DHS and DOD would benefit IAEA

Future Safeguards Technology Needs

The biggest needs are:

- LARGER BUDGET
- Trained people
- Forensics capabilities
- Surveillance, containment
- Open source data management/fusion
- Rad detectors hand held and room temp,
- Uranium isotope detection, esp. stand off detection
- Environmental sample analyses
- Online nuclear material monitoring equipment
- Remote information collection and transmission
- Measures to detect undeclared facilities

IAEA Long Term Technology Needs

IAEA Department of Safeguards Long Term R&D Plan 2012-2023

- Develop elemental and isotopic signatures of nuclear fuel cycle activities and processes (e.g. uranium conversion and laser enrichment), and apply them to analysis of environmental sampling and destructive analysis of nuclear material using mathematical, statistical and graphical tools. IRAN
- Develop analytical methodologies, tools, and techniques for 'all source analysis' to detect signatures of undeclared activity, and improve analysis of nuclear fuel cycles, including weaponization. DPRK, IRAN, SYRIA

IAEA Long Term Technology Needs

- Data analysis methods and computerized tools to analyse large amount of all-source information.
- Develop instruments and associated techniques to detect establishment and operation of nuclear fuel cycle activities. DPRK, IRAN
- Develop tools and techniques to characterize:
  - fissile content in metal mixtures containing actinides Np, Am and Cm during pyroprocessing,
  - fuel types for Gen IV reactors containing minor actinides,
  - seismic signals in geological repositories.
- Develop mechanism to enable safeguards to be considered early in facility design process. IRAN

IAEA Long Term Technology Needs

- Develop concepts, tools, and measures to enable IAEA verification approach for nuclear material destined for, and returned from, naval propulsion BRAZIL, IRAN
- Develop approach to provide credible assurance that nuclear material being used in naval propulsion is not used to produce nuclear weapons or other nuclear explosive devices. BRAZIL, IRAN
- Develop improved tools and techniques to detect misuse of reprocessing plants (real time detection of Pu separation) DPRK
- Develop tools and techniques to enable timely, potentially real time, detection of HEU production in LEU enrichment facilities IRAN

IAEA Long Term Technology Needs

- Develop more sensitive and less intrusive alternatives to existing NDA instruments to perform partial defect test on spent fuel assembly prior to transfer to difficult to access storage. DPRK
- Develop alternative NDA instruments, for instance based on liquid scintillators, to improve performance in neutron coincidence counting techniques applied to various types of fissile material.
- Develop minimally intrusive techniques that are both secure and authenticated to enable use of operator's systems, instruments and process monitoring to reduce costs of safeguards implementation.

IAEA Safeguards Needs US Experts

- Inspectors,
- Cost free experts,
  - Data analysts
  - Detector experts
  - Nuclear engineers
  - Physicists
- Junior professional officers,
- Interns
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THANK YOU