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Title:	International Safeguards Regime
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International Safeguards Regime

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ABSTRACT

This lecture describes the international safeguards regime. It details the role of the International Atomic Energy Agency (IAEA) in safeguarding the nuclear fuel cycle around the world. The technical objective of safeguards of "the timely detection of diversion of significant quantities of nuclear material from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and deterrence of such diversion by the risk of early detection" is elaborated on and made clear to the students. Examples of what significant quantities of nuclear material and timeliness of detection are made lucid to the students.

International Safeguards Regime

Public Policy and Nuclear Threats
University of California San Diego
Institute on Global Conflict and Cooperation (IGCC)
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Starting Point: Non-Proliferation Treaty (NPT)

- **The Fundamental nuclear arms agreement**
  - Prevents proliferation of nuclear weapons
- **NNWS at the time of signature (1968)…**
  - Agreed not to pursue nuclear weapons programs
- **Five NWS designated at the time of signature…**
  - Agreed to total and complete disarmament
  - USA, Russia, and U.K.(1968-70) France and China(1992)
- **Comprehensive Safeguards Agreements**
  - INFCIRC/153 (corr.) Model Agreement (1972)
    - U.S. Voluntary Offer Agreement - In force Dec 1980 - INFCIRC/288
- **Additional Protocol: Key Part of Strengthened Safeguards System**
  - INFCIRC/540 (corr.) Model Agreement (1997)
    - U.S. in force - January 2009 - INFCIRC/744

Let Us Define What is Safeguards

INFCIRC 153 Para. 28: The Safeguards Technical Objective

INFCIRC/153 Para. 28: The Safeguards Technical Objective

… the objective of safeguards is the *timely detection* of *diversion* of *significant quantities* of *nuclear material* from peaceful nuclear activities to the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown, and *deterrence of such diversion* by the *risk of early detection*…

NOTE:

- **Timeliness of Detection**
- **Significant Quantities (SQs) of Nuclear Material**
- **Deterrence by Risk of Early Detection**

"Nuclear Material and SQ" Defined

Nuclear Material	SQ in KG
Pu (<80% Pu-238)	8 kg Pu
U-233	8 kg U-233
HEU (=>20% U-235)	25 kg U-235
LEU (<20% U-235 including natural U and depleted U)	75 kg U-235 (or 10 t nat. U or 20 t depleted U)
Thorium	20 t Thorium

"Timeliness" - Material Guidelines
Detection Probabilities

Nuclear Material	Material Form	Conversion Time	IAEA Timeliness Goals
Pu, HEU or U-233	Metal	few days (7-10)	1 MONTH
Pure Pu components	Oxide (PuO_2)	few weeks (1-3)	
Pure HEU or U-233 compounds	Oxide (UO_2)	few weeks (1-3)	
MOX	Non-irradiated fresh fuel	few weeks (1-3)	
Pu, HEU or U-233	In scrap	few weeks (1-3)	
Pu, HEU or U-233	In irradiated fuel	few months (1-3)	3 MONTHS
LEU and Th	Unirradiated Fresh Fuel	order of 1 year	1 YEAR

Probability of Detection

Random Low-Low (10%)
Random Low (20%)
Random Medium (50%)
Random High (90%)

Note: INFCIRC/153 safeguards assume possibility of clandestine facilities

The Present Safeguards System
The Keystone = State Declarations

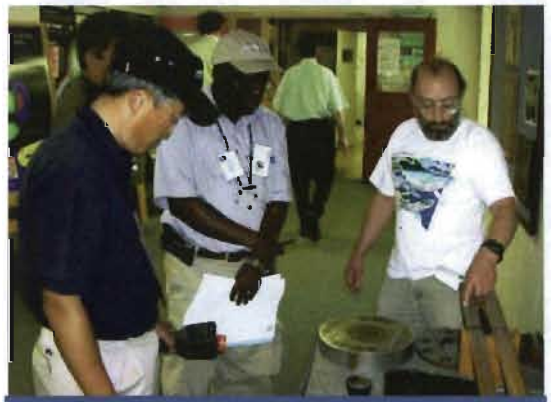
- **State Declarations** – The basis of everything

- **The principle of independent verification**
  - Started as a marriage of principles and practices borrowed from
    - Property accounting
    - Statistical quality control
    - Financial accounts auditing

Strengthened Safeguards System

THE UPDATED OBJECTIVES

"the safeguards system should be designed to provide credible assurances that there has been ***no diversion of declared nuclear material*** *and that there is* ***no undeclared nuclear material and activities*** *(BOG, March 1995)"*



Nuclear Material Accountancy

- Concepts of accountancy drive the CSA system
- Declarations – basis of everything
- Verify – via principle of independent verification
- Accountancy – includes
  - Balance numbers
  - Analyze verification
  - Review C/S

The Inspector Doing his Accountancy

Strengthened Safeguards System
Post 1991 Gulf War – SSS Inspection Role

- **Consequences for the Inspector**
  - Additional Protocol / Complementary Access
  - Emphasis on information based safeguards
  - Increased transparency measures
  - *The Investigative Inspector*
  - Ask questions! Think!

DDG-SG - Herman Nackaerts (1/19/10)
Not good enough for inspector to state he does something because it is in the Criteria. Why?

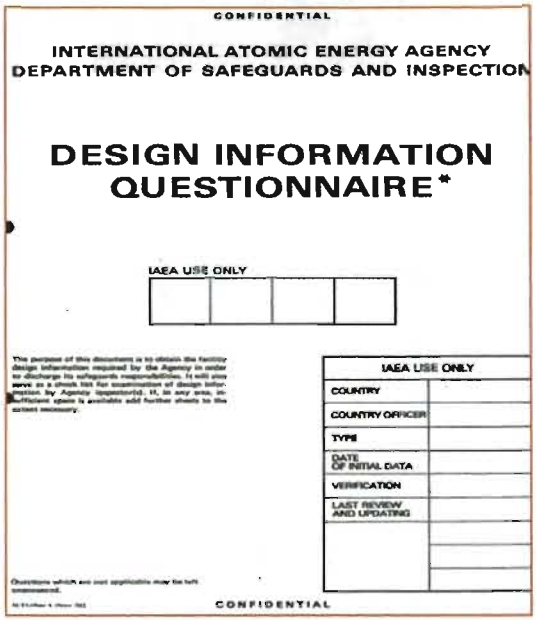
APCA TRAINING AT BNL USA 2006

RETURN FROM IRAN OCT 2009

Key to Transparency and Trust

Safeguards Confidential = Protection of Information

- What Needs to be Protected?
  - Design of a nuclear facility
  - Nuclear material information
    - Quantity
    - Location
    - Composition
    - Movement of nuclear material
  - Safeguards approach or goals for a specific facility
  - Results of a specific inspection
  - A.P. Declaration



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INTERNATIONAL ATOMIC ENERGY AGENCY
DEPARTMENT OF SAFEGUARDS AND INSPECTION

DESIGN INFORMATION QUESTIONNAIRE*

IAEA USE ONLY

IAEA USE ONLY	
COUNTRY	
COUNTRY OFFICER	
TYPE	
DATE OF INITIAL DATA	
VERIFICATION	
LAST REVIEW AND UPDATING	

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Summary

- NPT – very successful treaty agreement
- Accountancy – verifying declarations will still be key
- The inspector key to verifying NPT Art III commitments
- Access to States and Facilities is key – eyes and ears
- How to prove the negative → Find undeclared activities
- Use of Information → Future → Effective/Efficient