

***The Coming Nuclear Renaissance for
the Next Generation Safeguards Expert***

International Safeguards

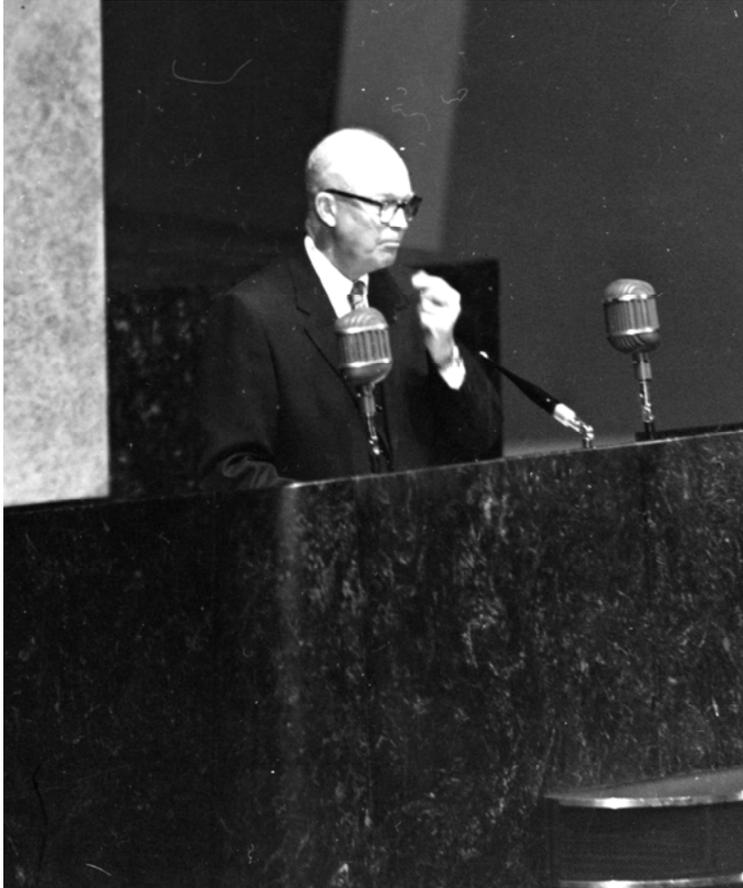
John Oakberg

December 16, 2008

Session Overview

- **Brief history of the International Atomic Energy Agency (IAEA or Agency)**
- **State systems of accounting for and control of nuclear material (SSACs)**
- **State declared information**
- **Non-declared information**
- **Agency inspections**
- **Verification measures and activities**
- **Drawing safeguards conclusions**

“Atoms for Peace” Speech by President Eisenhower in 1953



Proposing:

- An international agency for atomic energy
- Under the United Nations
- Serving the ‘peaceful pursuits of mankind’
- Verification of peaceful use of nuclear material

Founding of the IAEA

- **The “Atoms for Peace” speech initiated the process of setting up the IAEA**
- **In 1954, the USA amended domestic law to permit international nuclear cooperation**
- **Work began in 1955 on drafting the IAEA Statute**
- **The IAEA Statute was approved at the UN in New York, 1956**
- **July 1957, the Statute entered into force**
- **First IAEA General Conference was held in Vienna, Austria, October 1957**

The IAEA in Vienna, Austria



Vienna International Centre

Relationship with the United Nations

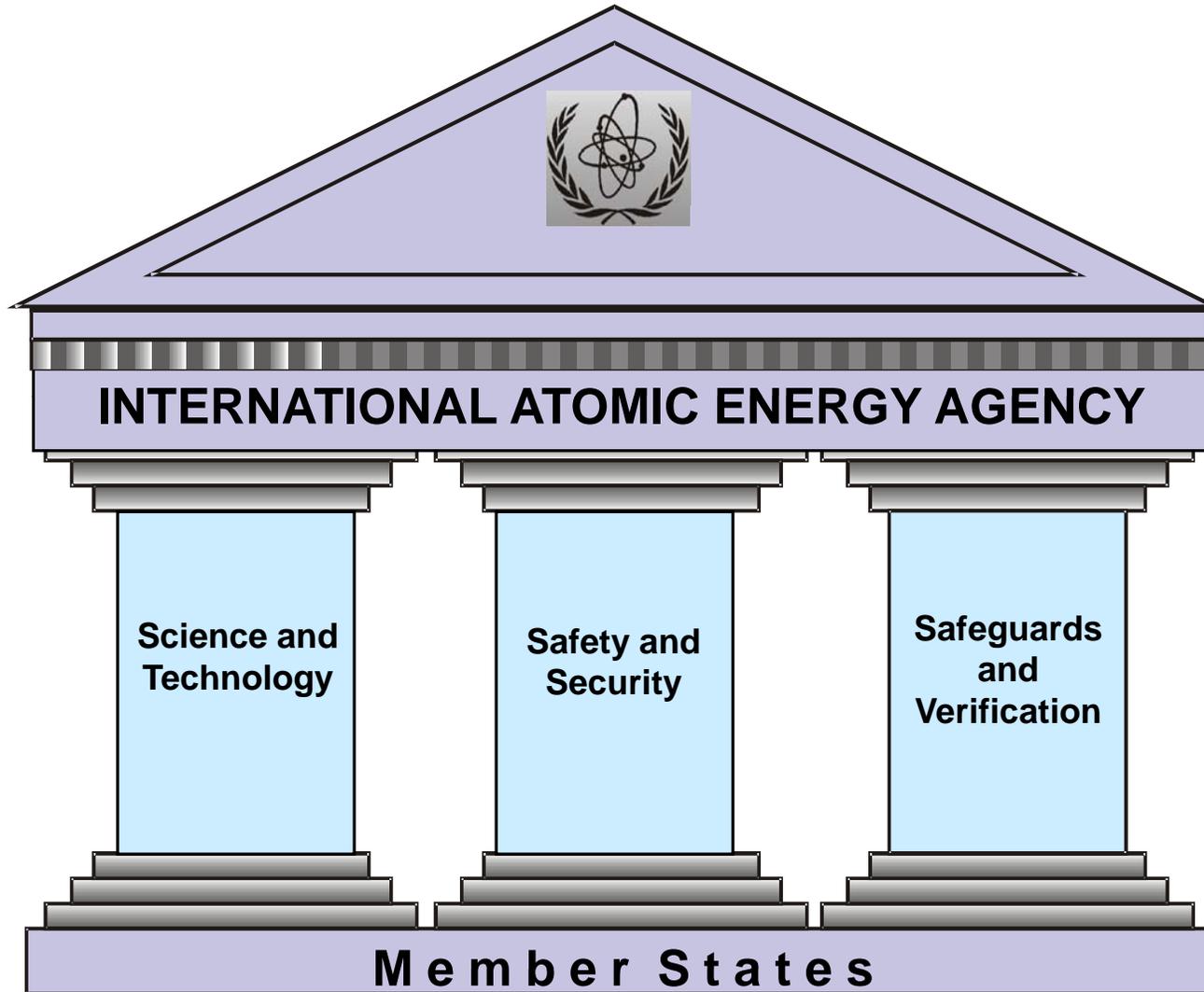


UN Headquarters in New York

The IAEA:

- **Autonomous, independent, science and technology-based, intergovernmental organization**
- **Within the UN System**
- **Annually provides a report to the UN General Assembly**
- **Directly reports to the Security Council**

The Three Pillars of the IAEA



State Safeguards System

- **SSAC: State system of accounting for and control of nuclear material**
- **States are required to establish and maintain an SSAC**
- **The SSAC needs to meet domestic and international obligations**
- **Activities and roles have expanded over the recent years**
- **There are two regional SSACs**
 - **Euratom – European Union**
 - **ABACC – Argentina and Brazil**

Establishment of an SSAC

- **Authority to meet requirements**
 - Designate a responsible organization
 - Define rights and obligations
 - Provide adequate resources to meet all obligations
- **Set up a system of rules and requirements**
 - For users of nuclear materials and technology
 - Regulatory authority functions
 - International needs – cooperation with the Agency

Basic SSAC Organization

- **Control of nuclear material (Users)**
 - Conditions of use, ownership, licensing
 - Inventory taking and changes to inventories, recording, reporting
- **Accounting for nuclear material (State)**
 - Information system (records and reports)
 - Verification system (audit, inspection)
 - Requirements and procedures
- **Additional protocol information**
 - Information system (records and declarations)
 - Information sources
 - Verification system (audit, inspection)

SSAC Should Provide

- **Cooperation with the IAEA**
 - Establish and maintain contact
 - Provide information (reports, declarations)
 - Support IAEA verification activities
- **For compliance with relevant regulations**
 - Quality assurance
 - Audit system
 - Training
- **The necessary resources**
 - Human (staff, qualification, training)
 - Technical (equipment, travel)
 - Financial (budget provisions)

Safeguards Information Obligations

➤ States

- Establish systems for accounting and control
- Maintain information
- Provide records to the IAEA Inspectorate
- Report to the Agency

➤ IAEA

- Ensures information requirements are met
- Verifies declarations
- Performs analysis
- Draws conclusions
- Informs States

NPT Nuclear Material Information

- **Oriented towards safeguarding all nuclear materials in a State**
 - **Enriched Uranium**
 - **Natural uranium**
 - **Depleted uranium**
 - **Plutonium**
 - **Thorium**
- **Nuclear material accounting reports on**
 - **Inventories (physical amounts)**
 - **Balances (over a time period)**
 - **Inventory changes (increases and decreases)**

Additional Protocol Declarations

- **Full declaration of all nuclear-related matters in a State, including:**
 - Nuclear related activities
 - Site descriptions
 - Transfers of source material for non-nuclear use
 - Stocks of source material (all uses)
 - Transfers of equipment
 - Processing of waste
 - Future plans
- **Information other than nuclear material accountancy**

Voluntary Agreements/Arrangements

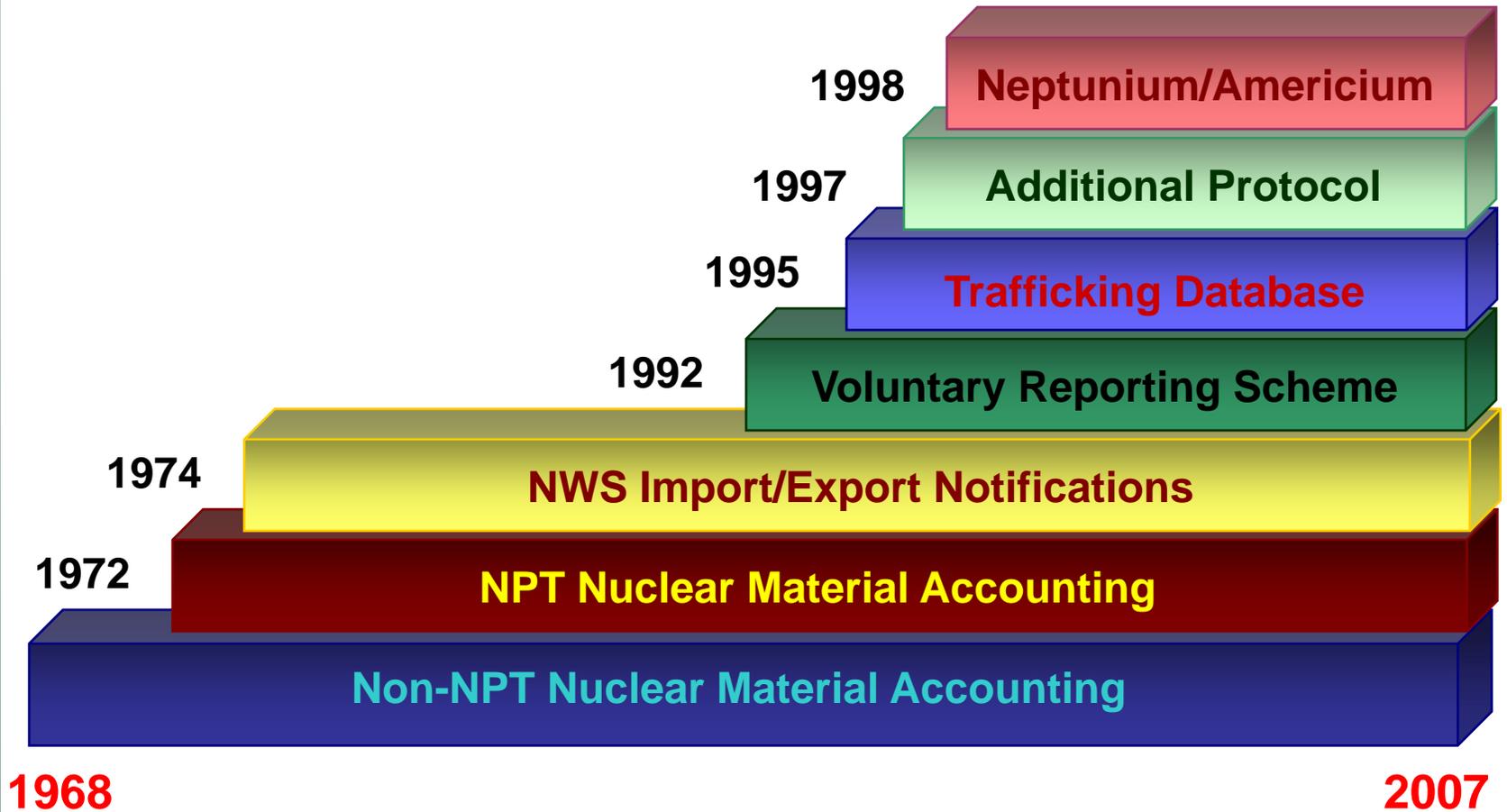
- **Nuclear weapon States (NWS)**
 - China, France, Russia, United Kingdom, USA
 - NPT-type safeguards agreements
 - IAEA selects facilities for application of safeguards
 - Import/export notifications for nuclear material transfers with non-nuclear weapon States
- **Voluntary reporting scheme (primarily before the additional protocol)**
- **Trafficking database**
- **Neptunium/Americium**

Prior to NPT (Non-NPT)

- **Safeguards applied to:**
 - **Nuclear material**
 - **Facilities**
 - **Equipment**
 - **Non-nuclear material**
 - **Technological information**
- **Agreements for applying safeguards on specific facilities, transfers or projects**
- **Over 30 States had such agreements in the past – now implemented in 3 States**

Declared Information

Haselwood Enterprises, Inc.

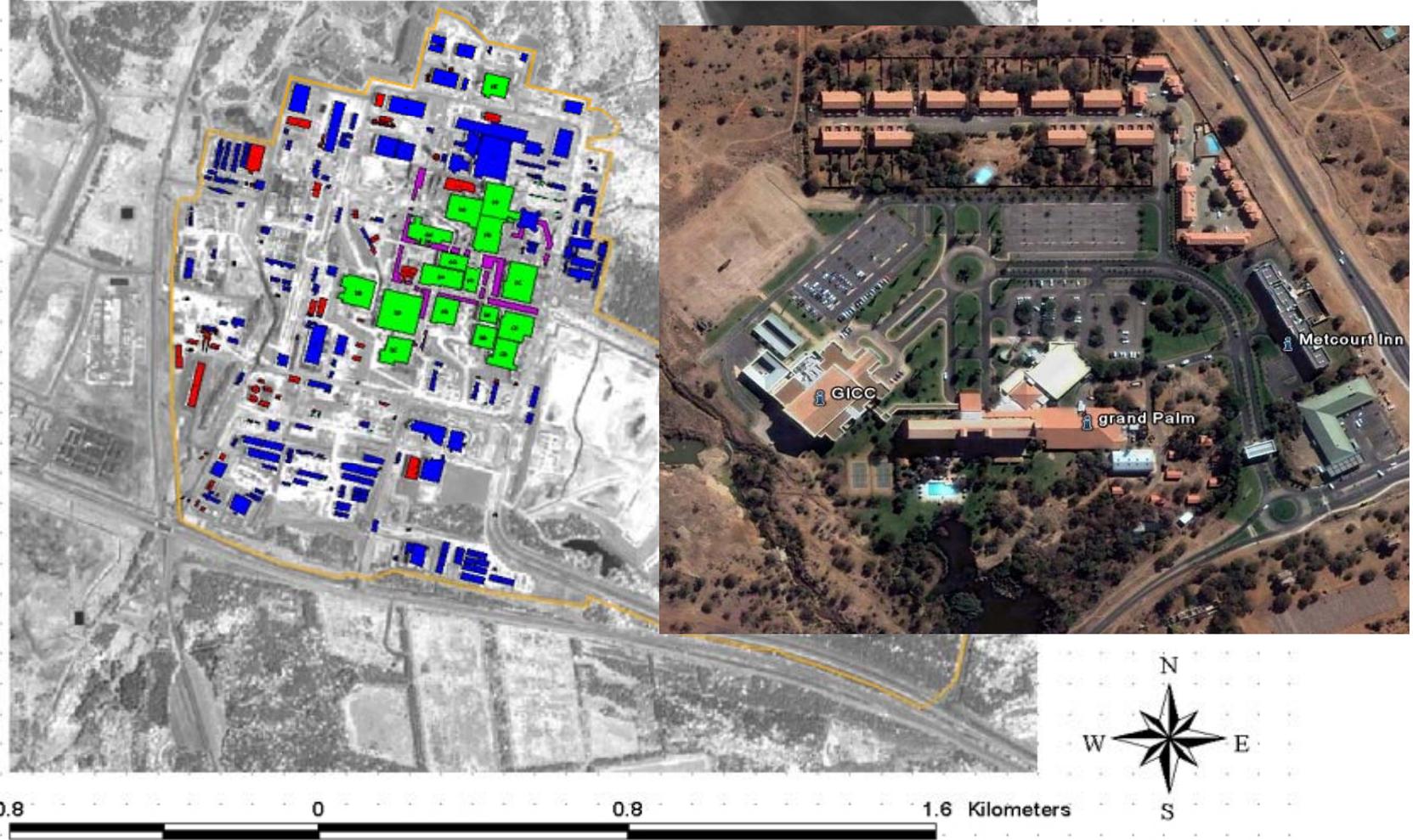


Non-declared information

- **From IAEA activities**
- **Satellite imagery**
- **Scientific and technical literature**
- **Academic and research institutions**
- **Trade publications**
- **Newspapers/radio/television/magazine reports/Internet**
- **Third party sources**

Satellite Imagery

Satellite Imagery is being used to help evaluate Additional Protocol Declarations



Technology and Trade Analysis

Procurement Tracking System - 1.4.0

Documents | Cases | Entities | Links | Search

Organization | Person | Procurement | Account

Organization Search

Information

Name:

Country:

Type:

1st Known Date: Last Known Date:

Data Quality:

Update Clear

Communication

Locator	City	Country	Type	Confidence
43940942	Vienna	International Atomic Energy Agency (IAEA)	Telephone	High confidence
43332225	Vienna	International Atomic Energy Agency (IAEA)	Telephone	High confidence
32963	Vienna	International Atomic Energy Agency (IAEA)	F.O.Box	High confidence
43940352	Vienna	International Atomic Energy Agency (IAEA)	Fac	High confidence
43331626	Vienna	International Atomic Energy Agency (IAEA)	Fac	High confidence

Location

Address	Country	Type	Confidence

Person

Name
John Smith
Jane Smith

Accounts

Name



IAEA
 الوكالة الدولية للطاقة الذرية
 国际原子能机构
 International Atomic Energy Agency
 Agencia Internacional de Energía Atómica
 Международное агентство по атомной энергии
 Organizație Internațională de Energie Atomică

Procurement Tracking System
 Automated Structure Report

Generated By:
 Date:

Print Report **Details:**

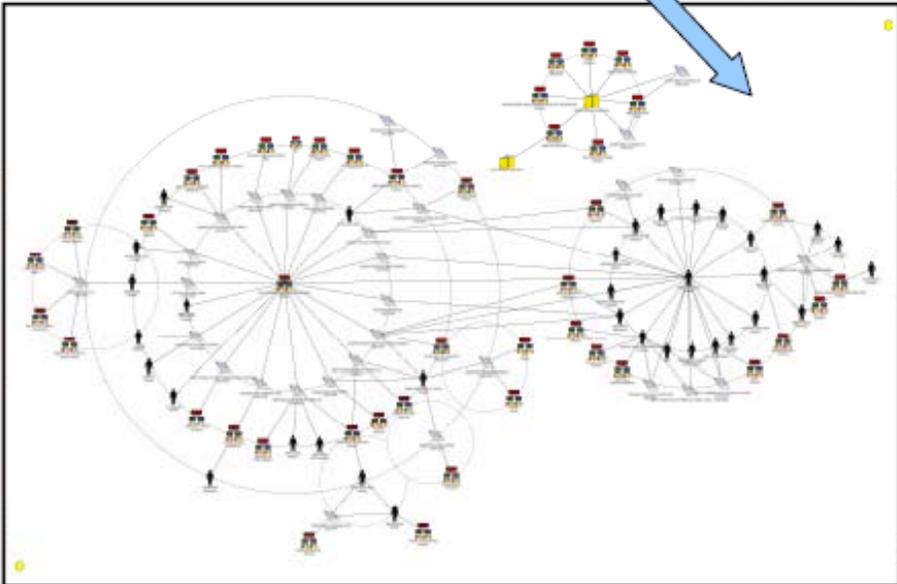
Item	Quantity	Unit	Percent
Person	20		

Locations

Item	Address	City	Country
Person	International Atomic Energy Agency (IAEA)	Vienna	Austria
Person	43332225	Vienna	Austria
Person	43331626	Vienna	Austria
Person	www.iaea.org/eng/iaea/		
Person	164		

Active

Item	Address	City	Country
Person	International Atomic Energy Agency (IAEA)	Vienna	Austria
Person	43332225	Vienna	Austria
Person	43331626	Vienna	Austria
Person	www.iaea.org/eng/iaea/		
Person	164		



Verification Principle

*The IAEA does trust,
but has to verify*

- **Inspections – physical access to locations**
- **Verification measures**
- **Drawing a Safeguards Conclusion**

Reasons for Performing Inspections

- **Verify that reports are consistent with records**
- **Account for declared nuclear material**
 - **Verify location, identity, quantity and composition**
 - **All nuclear material subject to safeguards under the agreement**
- **Verify information on the possible causes of unaccounted material**
 - **Shipper/receiver differences**
 - **Uncertainties in the inventory**
- **Confirm that safeguards relevant operations are as declared**

Types of Inspections

- **Design information examination and verification (DIE, DIV)**
- **Inspection**
 - Routine
 - Special (rarely invoked)
- **Technical visits**
- **Complementary access**



Design Information Verification



Design information is verified to assure that appropriate safeguards measures are applied and to detect potential misuse of a facility

Routine Inspections



Technical Visits

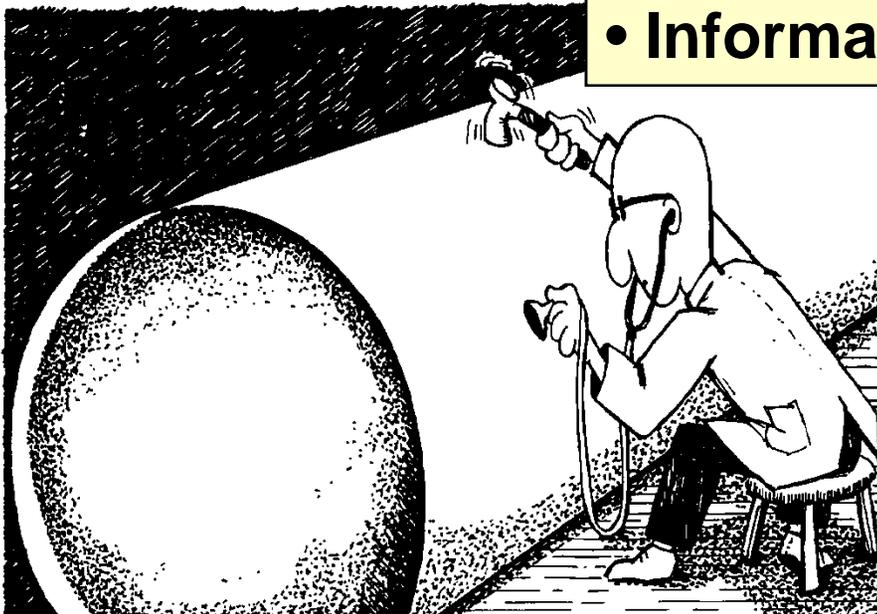
- **To perform a facility site survey**
- **To support the installation of safeguards equipment**
 - **Surveillance cameras**
 - **Other safeguards monitoring equipment**
- **To visit non-Safeguarded sites and facilities**
 - **Invoked when Additional Protocol is not in force**
 - **State must agree to the visit**

Complementary Access

- **Provides access to all aspects of a State's nuclear fuel cycle**
- **From mines to nuclear waste**
- **Short-notice inspector access to all buildings on a nuclear site**
- **Other locations where nuclear material for non-nuclear uses is present**
- **Fuel cycle-related research and development**

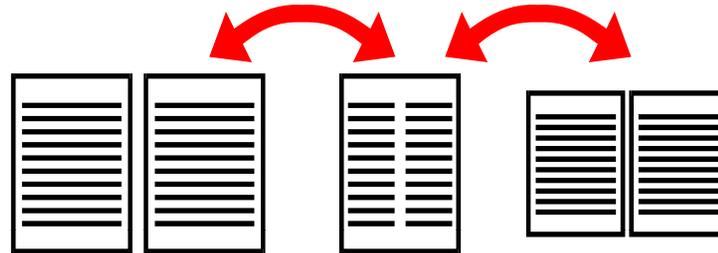
Safeguards Verification Measures

- Nuclear Material Accountancy
- Containment and Surveillance
- Environmental Sampling
- Information Sources

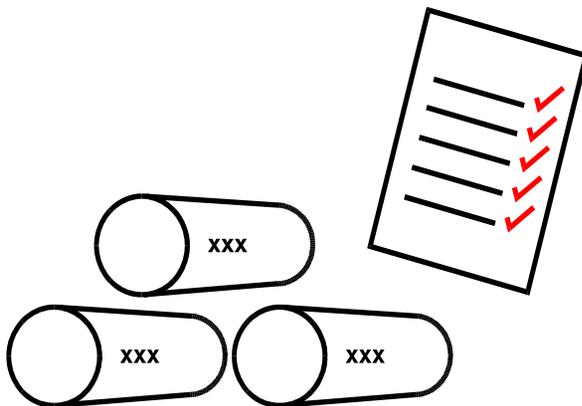


Nuclear Material Accountancy

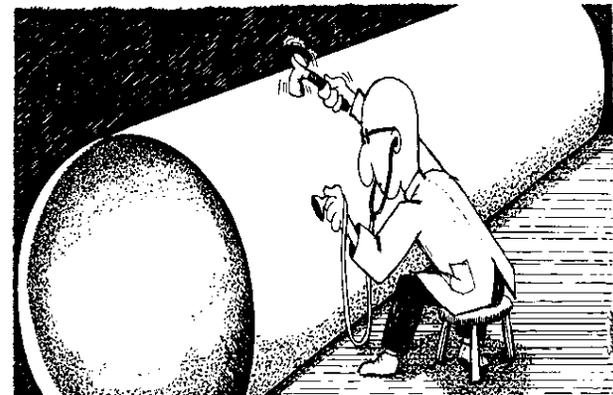
Records Examination



Item Counting and Identification



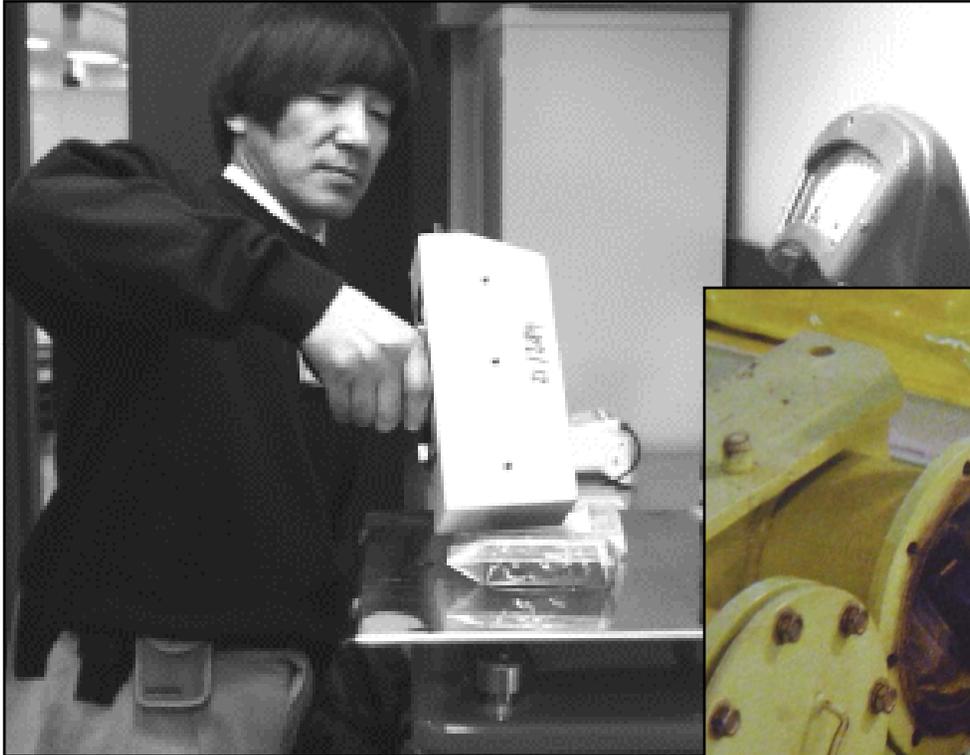
Measurements and Sampling



Item Counting



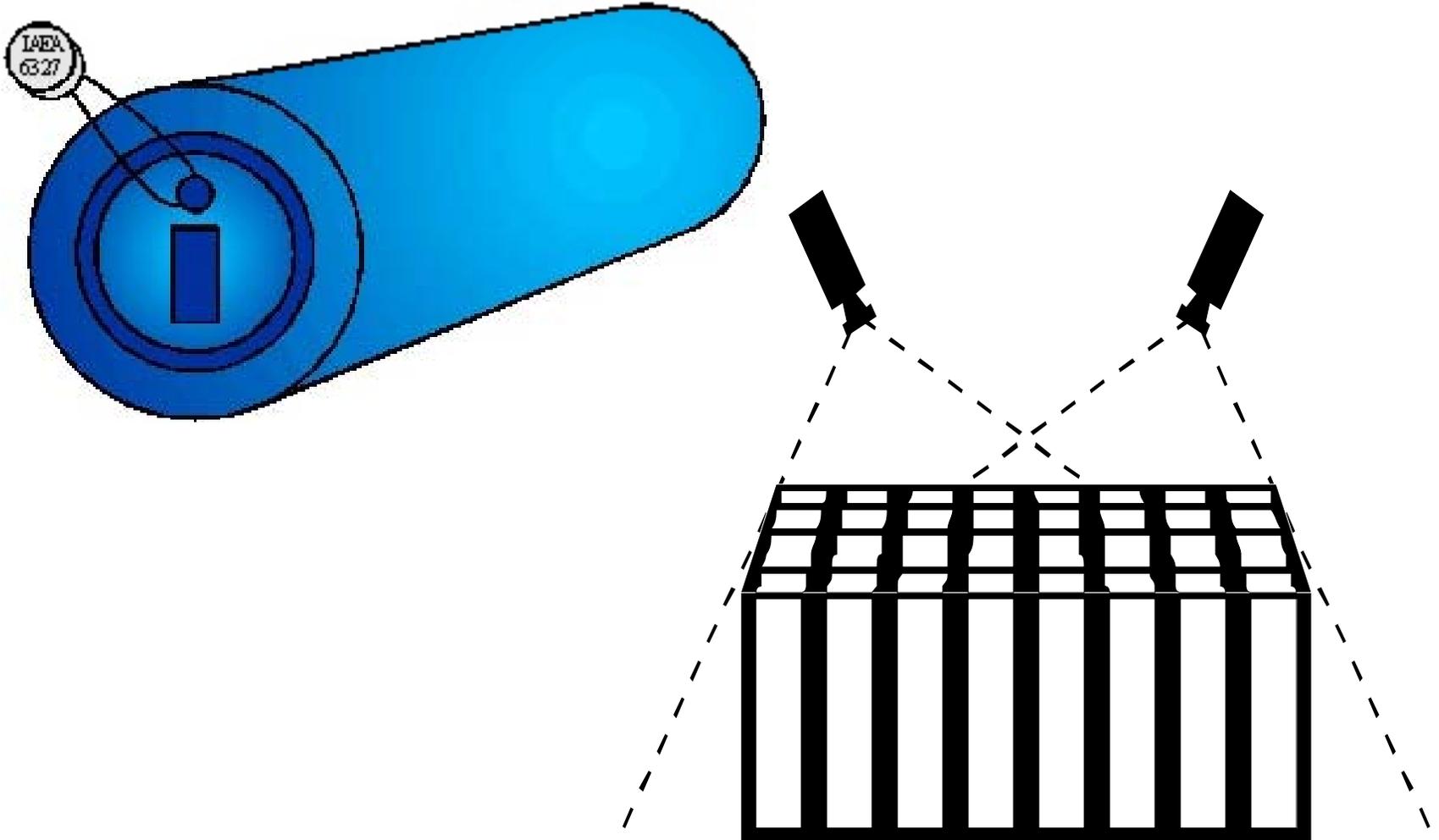
Measurements



Nuclear Material Sampling



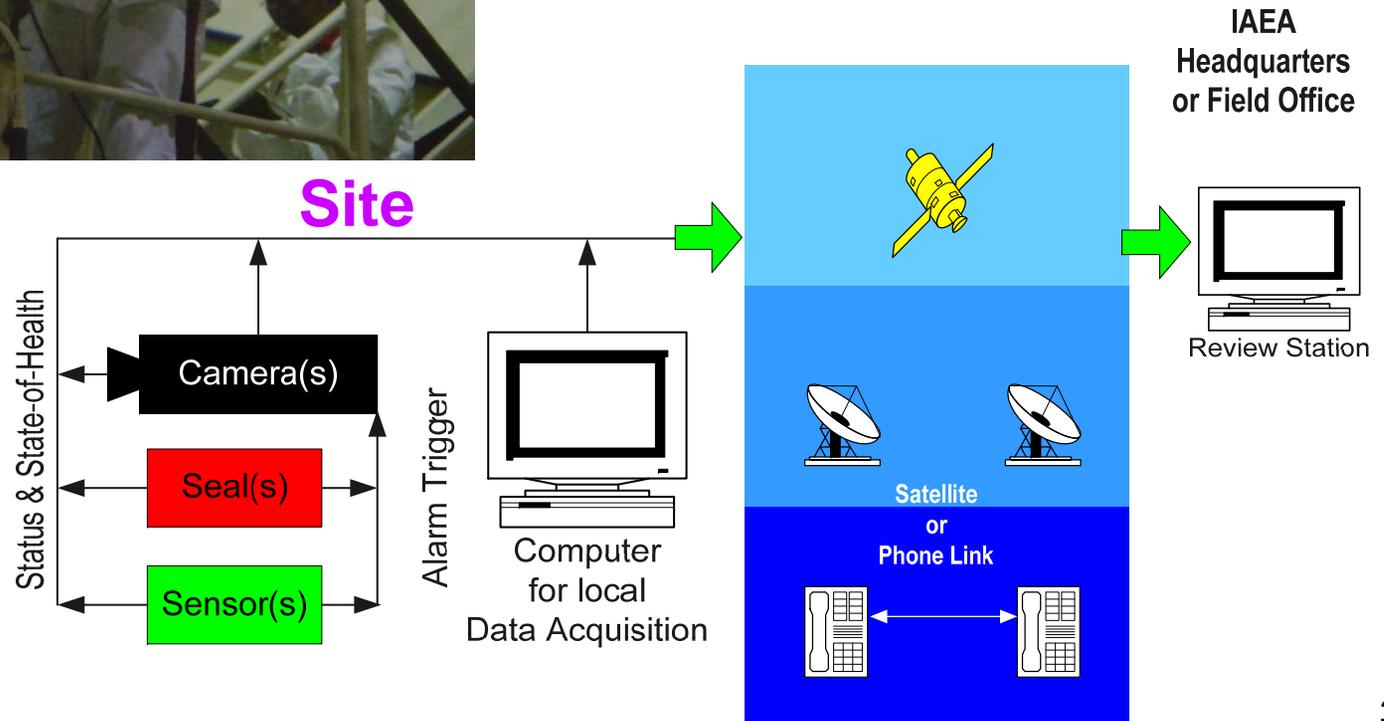
Containment and Surveillance



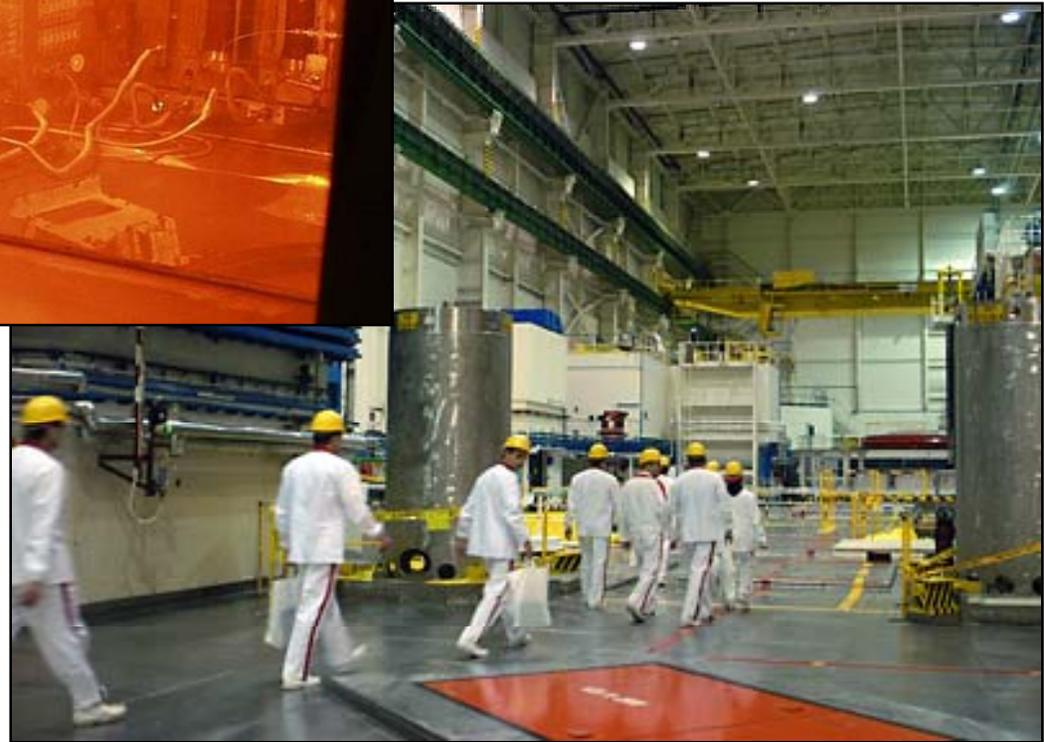
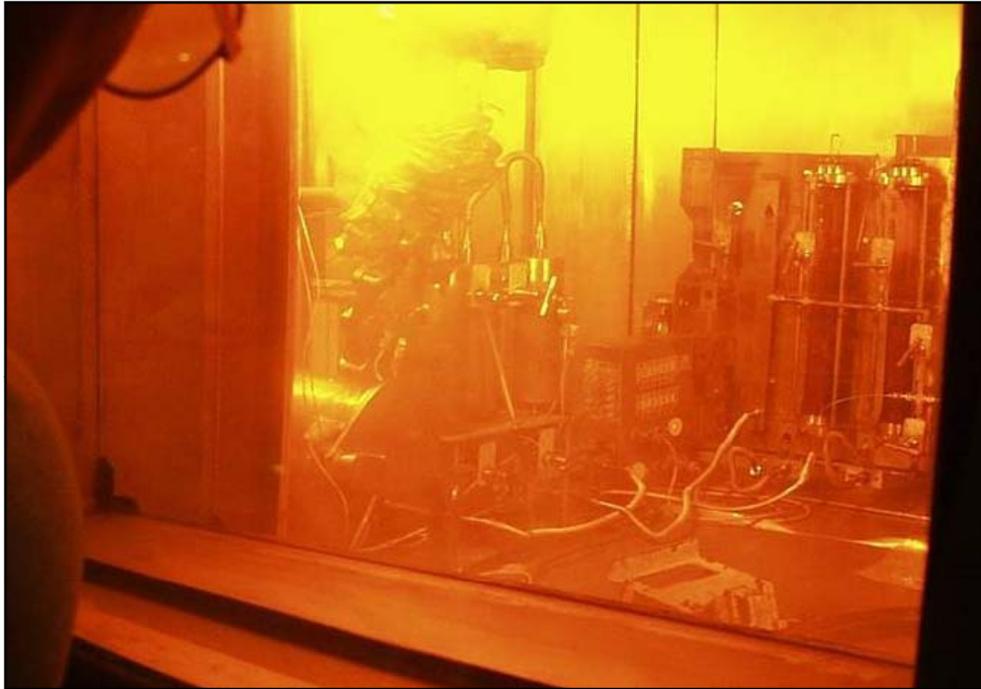
Containment and Surveillance Sealing Systems



Containment and Surveillance Remote Monitoring



Visual Observation



Environmental Sampling



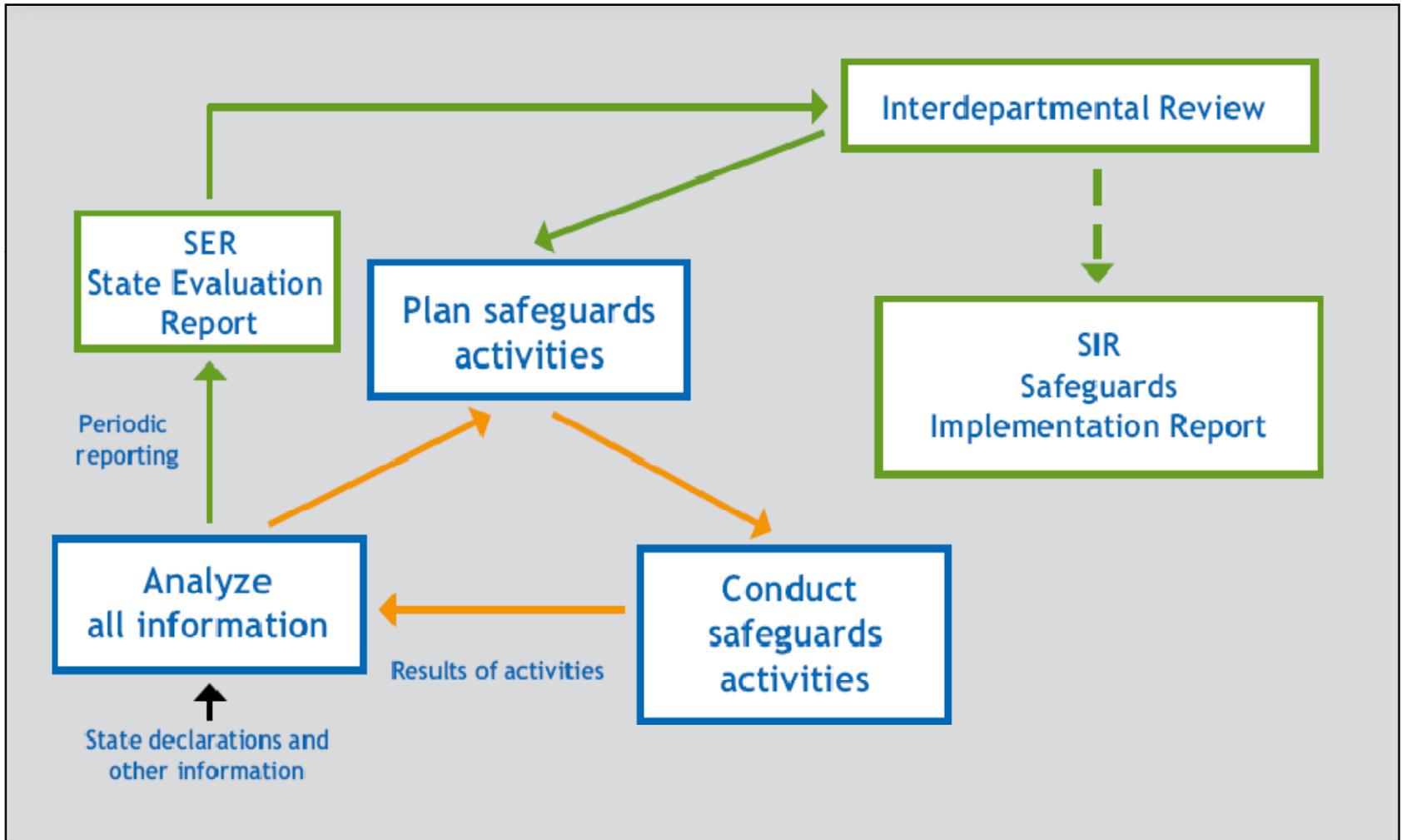
The Agency has a Broad View of Safeguards Information

- **Access to a unique composition of safeguards information**
 - **From IAEA activities**
 - **Satellite imagery**
 - **Scientific and technical literature**
 - **Academic and research institutions**
 - **Trade publications**
 - **Newspapers/radio/television/magazine reports/Internet**
 - **Third party sources**
- **Agency tasks to:**
 - **Extract, analyze and correlate information**
 - **Draw a safeguards conclusion for a State**

State Level Approach to Safeguards

- **“Information Driven Safeguards”**
 - Use of all available information about a State’s nuclear programme
 - For planning, implementing and evaluating safeguards activities in a State
- **A comprehensive State evaluation is conducted to provide a full picture of a State’s nuclear programme**
 - Involves comparison and assessment of all information available
 - Identifies issues requiring follow up
- **State evaluation is documented in an annual State Evaluation Report and forms the basis for drawing Safeguards conclusions**

Carrying out State evaluations

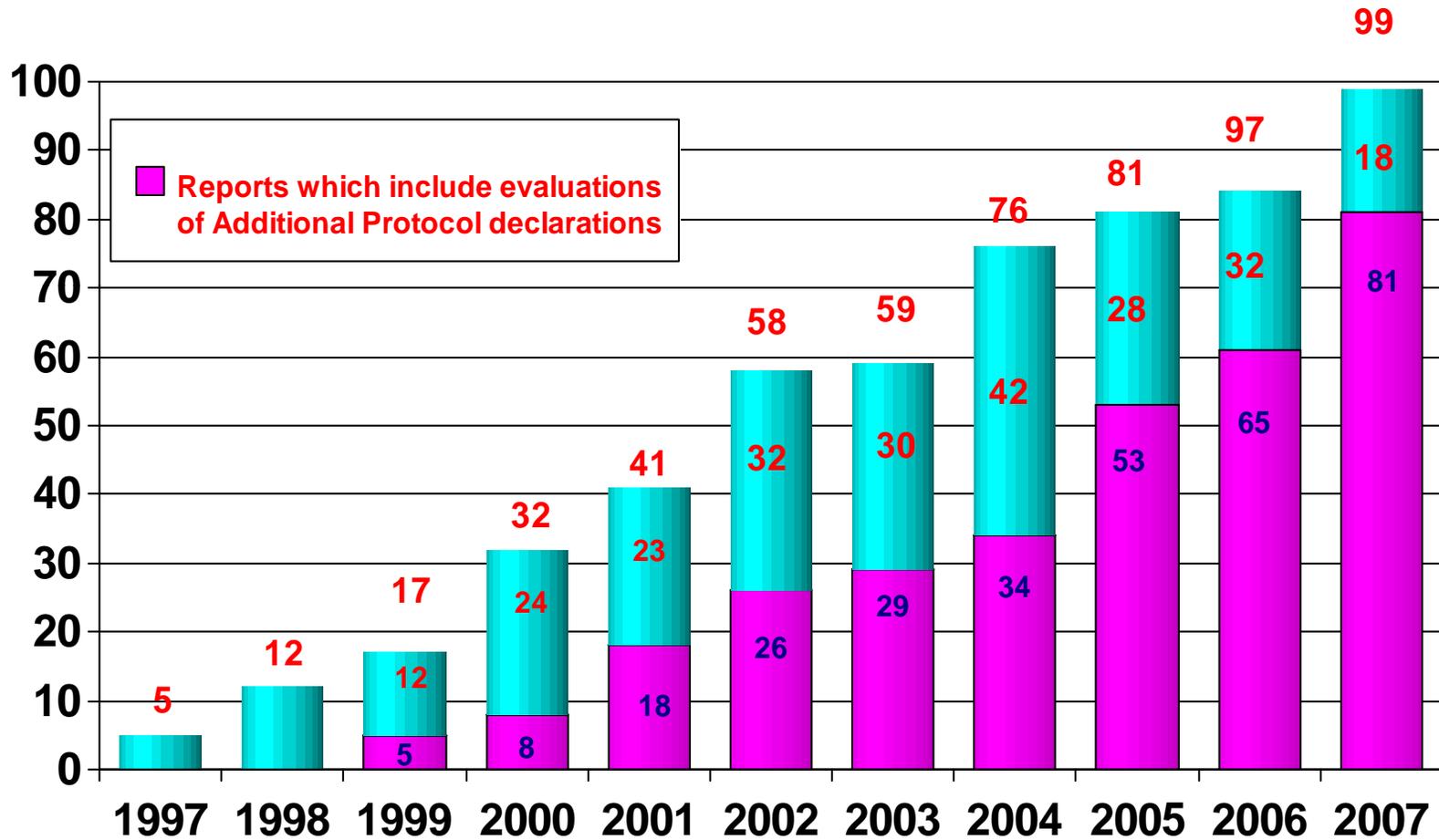


Drawing a Conclusion for a State

- **For a State having a comprehensive safeguards agreement but not yet an additional protocol in force**
 - The conclusion covers only the non-diversion of declared nuclear material
- **For a State having a comprehensive safeguards agreement *with* an additional protocol in force**
 - The Agency is able to draw broader conclusions that provide for greater nuclear transparency
 - Those conclusions cover both the non-diversion of declared nuclear material ***and*** the absence of undeclared nuclear material and activities

State Evaluation Reports

Haselwood Enterprises, Inc.



Integrated Safeguards

For States with comprehensive safeguards agreements and additional protocols

- **Can reach a broader safeguards conclusion regarding the non-diversion of declared nuclear material and the absence of undeclared nuclear material and activities**
- **Safeguards measures can be ‘optimized’**
- **This optimization of all safeguards measures available under comprehensive safeguards agreements and additional protocols is known as integrated safeguards.**

Safeguards Outlook

- **The IAEA is committed to making transition from traditional safeguards to an integrated and more cost-effective strengthened safeguards system**
- **Elements of integrated safeguards will be further developed and refined in light of implementation experience, further evaluation, and available technology**
- **The safeguards system will continue to evolve as it responds to new challenges and circumstances**

Summary

- **Brief history of the IAEA**
- **State safeguards systems**
- **State declared information**
- **Non-declared information**
- **IAEA inspections (access to sites)**
- **Verification measures and activities**
- **Drawing safeguards conclusions**



Discussion and Questions

