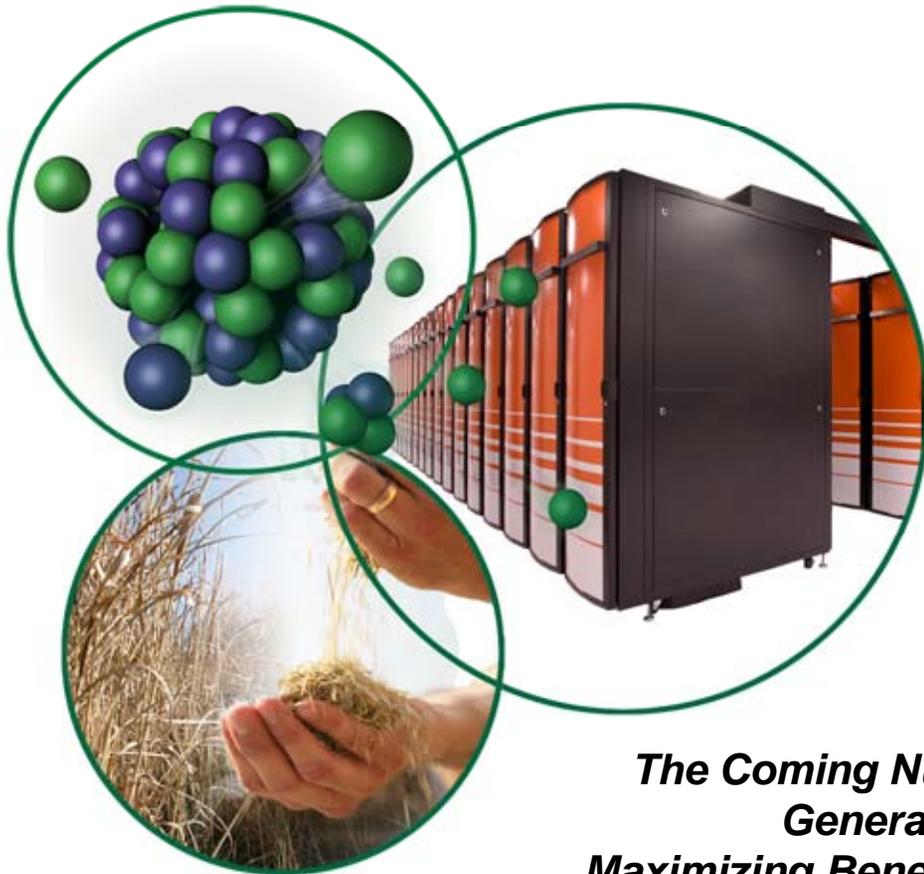


Nuclear Nonproliferation Regime and International Safeguards



Ana C. Raffo Caiado
International Safeguards Group
Global Nuclear Security Technology
Division (GNSTD)
Oak Ridge National Laboratory

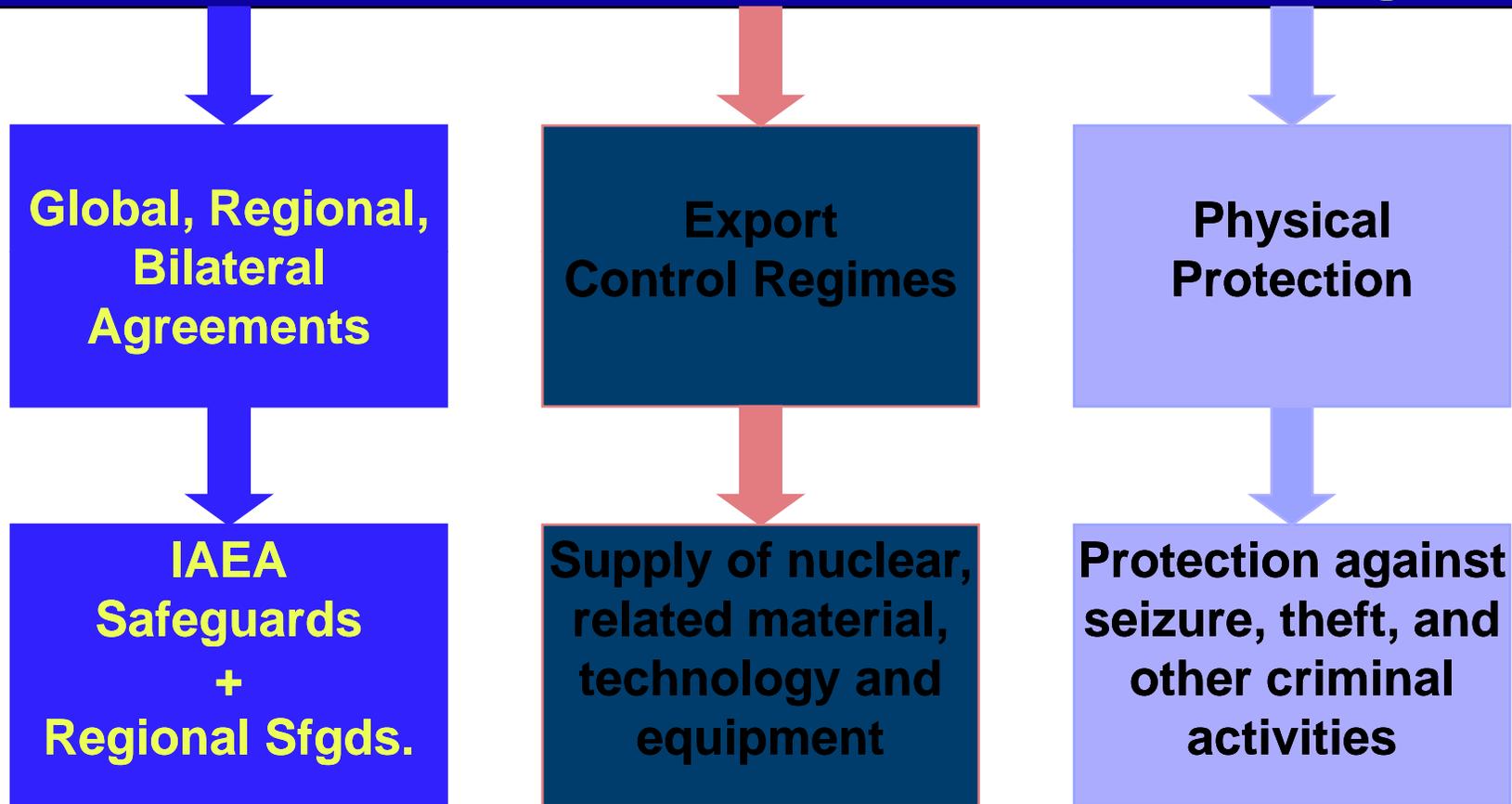
***The Coming Nuclear Renaissance for the Next
Generation Safeguards Experts
Maximizing Benefits While Minimizing Proliferation
Risks***

December 15-18, 2008

“A rule of international law is one that has been accepted as such by the international community of states in form of customary law; by international agreements; or by derivation from general principles common to the major legal systems of the world.”

(in International Law, 4th edition
by Damrosch, Henkin,
Pugh, Schachter, and Smit)

The Nuclear Non-Proliferation Regime



Nuclear Nonproliferation Regime

- **Regulated by international agreements and conventions**
- **Often described as a “puzzle” formed by different interests and regulated by so-called “building blocks”**
 - **The pieces of the puzzle:**
 - **many different but correlated interests involved in international relations (economic, political, social, religious, cultural, etc.)**
 - **The building blocks:**
 - **all legal instruments in place to regulate the regime**



US President Eisenhower made his "Atoms for Peace" proposal to the United Nations General Assembly. New York City - December 8, 1953

Nuclear Nonproliferation Regime

- **The nuclear non-proliferation regime is much more than the Nuclear Nonproliferation Treaty (NPT).**
- **The regime includes:**
 - **Treaties, conventions and common (multilateral and bilateral) arrangements covering:**
 - **security and physical protection, export controls, nuclear test-bans, and potentially, fissile material production cut-offs.**

Earlier Nonproliferation Attempts

United Nations Atomic Energy Commission (UNAEC)

- Created on 24 January 1946**
- Established within the UN**
- Countries represented on Security Council**

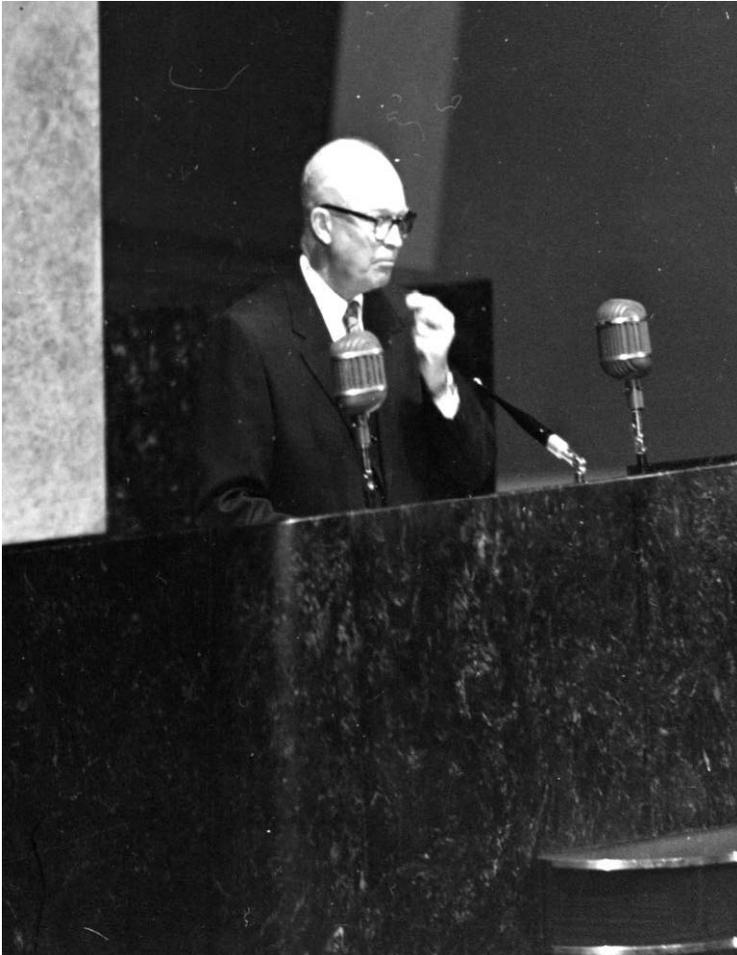
Note: UN charter signed on 26 June 1945

UNAEC: The Baruch Plan (June 1946)

- **“International Atomic Development Authority” (IADA)**
- **Elimination of the veto right**
- **Debates until 1948**
- **First atomic test by USSR, September 1949**
- **UNAEC: Dissolved in 1952**

Atoms for Peace

Eisenhower's Speech at the UN, 8 Dec. 1953



- **“An International Agency for Atomic Energy”**
- **Under the UN**
- **Responsible for nuclear material**
- **Promote peaceful applications of atomic energy**
- **Verification of peaceful use of nuclear material**

The EURATOM Regional System



- **The European Atomic Energy Community (EAEC or EURATOM) is an international organization which is semi-independent of, but completely controlled by, the European Community pillar of the European Union.**
- **Established on 25 March 1957 by the Treaty of Rome**
- **The task of Euratom Safeguards is to ensure that within the European Union nuclear material is not diverted from its intended use and that safeguarding obligations assumed by the Community under an agreement with a third state or an international organization are complied with.**

The Creation of the IAEA: Drafting the Statute



Conference in Washington (February - March 1956)

- 12 “interested countries”
- Draft statute prepared by the U.S. in March 1955

Conference in New York (September 1956)

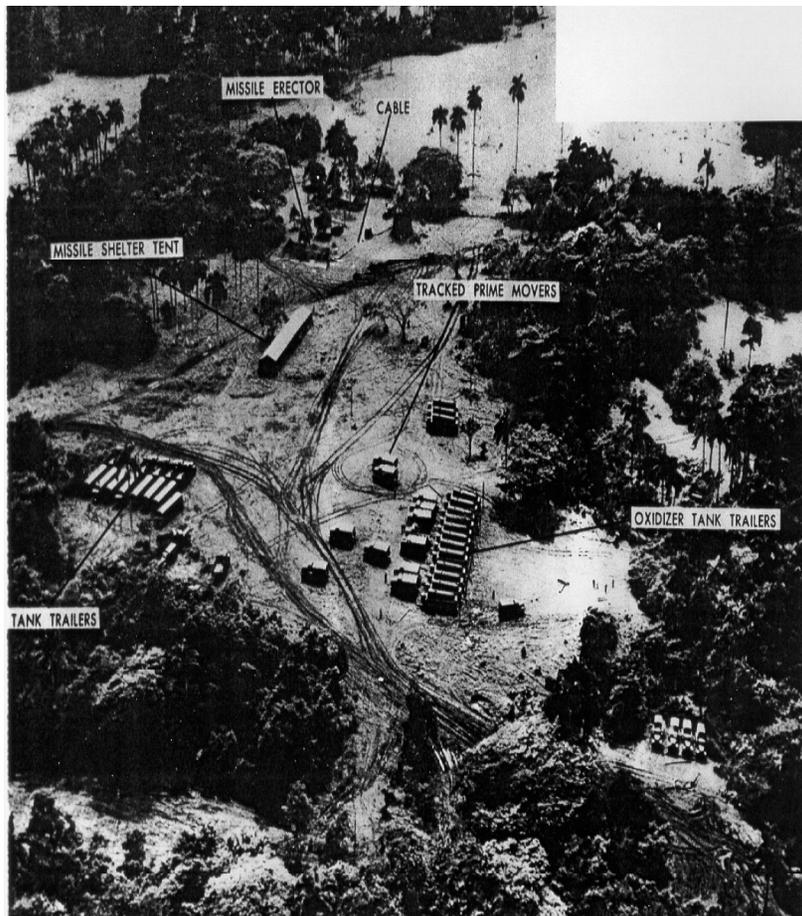
- “Gathering” of 81 countries at UN Headquarters
- Revised statute approved (23 October 1956)
- The Statute of the IAEA

IAEA Statute in force 29 July 1957: The IAEA was created.

The First Safeguards Systems

- **The Agency's Safeguards System of January 1961: INFCIRC/26**
- **The first extensive Agency's Safeguards System of February 1965: INFCIRC/66**
- **INFCIRC/66 Rev 1 and 2 (1966 and 1968)**
Still applied for certain facilities in India, Israel and Pakistan
- **1962: First Safeguards Inspection (verification of design of a 3 MW(th) reactor in Norway)**

The Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Tlatelolco Treaty, 1967)



- **1962 Cuban missile crisis**
- **Opened for signature on 14 February 1967**
- **Experience helpful for NPT negotiations**
- **Signed by all Latin American and Caribbean countries**

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

- **Foundation of the nuclear nonproliferation regime**
- **Background**
 - Missile crisis in Cuba (1962)
 - France and China joined the ‘Nuclear Club’ (1960 and 1964)
 - Limited Test Ban Treaty (U.S. + USSR, 1963)
- **Opened for signature on 1 July 1968, at ceremonies taking place in London, Moscow, and Washington, D.C**
- **59 States would become signatories to the NPT that day**
- **Treaty entered into force in 1970, following ratification by 40 States Party**
- **Most widely accepted arms control agreement with nearly 190 parties today**



Britain's Foreign Secretary Michael Stewart (second from right, seated) signs the NPT on 1 July 1968 at Lancaster House, London, witnessed by United States Ambassador David Bruce (far right, seated) and Soviet Ambassador to Mikhail N. Smirnovsky (second from left, seated).

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

- **NPT's main objectives:**
 - **To stop the further spread of nuclear weapons,**
 - **To provide security for non-nuclear weapon states which have given up the nuclear option,**
 - **To encourage international co-operation in the peaceful uses of nuclear energy, and**
 - **To pursue negotiations in good faith towards nuclear disarmament leading to the eventual elimination of nuclear weapons.**

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

- **Nuclear Weapon States (NWS):**

- Five states which had detonated a nuclear explosive device before 1 January 1967 [China, France, the USSR, the United Kingdom and the United States]
- Not to transfer nuclear weapons, other nuclear explosive devices, or their technology to any non-nuclear weapon state
- To pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control (Article VI)

- **Non-Nuclear-Weapon States (NNWS):**

- Undertake not to acquire or produce nuclear weapons or nuclear explosive devices (Article II)

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

- **Frequently cited concerns about the NPT include:**
 - **The inequity of nuclear-weapon states versus non-nuclear-weapon states;**
 - **Timetable for adherence to disarmament commitments on the part of nuclear-weapon states; and**
 - **Non-universality of the NPT, as not every state has become party to the Treaty.**

Other Weapons of Mass Destruction Treaties

- **Chemical Weapons Convention (CWC) with 175 signatories**
- **Comprehensive Test Ban Treaty (CTBT) with 176 signatories**

Nuclear Nonproliferation Regime

Additional legal instruments play significant role in regulating the nuclear nonproliferation regime:

- Convention on the Physical Protection of Nuclear Material**
- Regional treaties establishing nuclear-weapons-free-zones**
 - Treaty of Tlatelolco (Opened for signature 1967)**
 - Treaty of Rarotonga (Opened for signature 1986)**
 - Treaty of Bangkok (Opened for signature 1995)**
 - Treaty of Pelindaba (Opened for signature 1996)**
 - Central Asia (Proposed 1995)**
 - Southern Hemisphere (Proposed 1996)**

Export Controls

- **Shortly after entry into force of the NPT, multilateral consultations on nuclear export controls led to the establishment of two separate mechanisms for dealing with nuclear exports:**
 - **The Zangger Committee in 1971**
 - **The Nuclear Suppliers Group (NSG) 1974**

The Zangger Committee

- **Also known as the Nonproliferation Treaty Exporters Committee, was set up to consider how procedures for exports of nuclear material and equipment related to NPT commitments.**
- **In August 1974 the committee produced a trigger list of items which would require the application of IAEA safeguards if exported to a non-nuclear weapons state which was not party to the NPT. The trigger list is regularly updated.**

India's Explosion (1974)



Underground test site in Nevada, USA

At Pokharan, Rajasthan

- Underground explosion
- No violation of a treaty or agreement

The Nuclear Suppliers Group (NSG)

- **Also known as the London Group or London Suppliers Group**
- **Set up in 1974 after India exploded its first nuclear device**
- **The group communicated its guidelines, essentially a set of export rules, to the IAEA in 1978. These were to ensure that transfers of nuclear material or equipment would not be diverted to unsafeguarded nuclear fuel cycle or nuclear explosive activities, and formal government assurances to this effect were required from recipients.**
- **The NSG Guidelines also recognized the need for physical protection measures in the transfer of sensitive facilities, technology, weapons-usable materials, and strengthened retransfer provisions.**
- **The NSG began with seven members -- the USA, the former USSR, the UK, France, Germany, Canada and Japan - but now includes 47 countries.**

International Safeguards

- **Article III of the NPT**

“Each non-nuclear weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the IAEA and the Agency’s safeguards system, for the exclusive purpose of verification of the fulfillment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. (...)”



International Safeguards

International Safeguards are:

- **Arrangements to account for and control the use of nuclear materials**
- **Verification is a key element in the international system to ensure that uranium in particular is used only for peaceful purposes**
- **Nuclear safeguards are a means of reassurance whereby non-nuclear weapons states demonstrate to others that they are abiding by their peaceful commitments**
- **Specific objective is to verify whether declared nuclear material remains within the civil nuclear fuel cycle and whether or not it is being used solely for peaceful purposes**



International Safeguards

- **Safeguards inspections require that:**
 - **Operators of nuclear facilities maintain and declare detailed accounting records of all movements and transactions involving nuclear material**
 - **Records and the actual nuclear material are audited**
 - **Inspections by the IAEA are complemented by other measures such as surveillance cameras and instrumentation**



International Safeguards

- **Traditional safeguards**
 - To deter the diversion of nuclear material from peaceful use by maximizing the risk of early detection
 - Provide assurance to the international community that countries are honoring their treaty commitments to use nuclear materials and facilities exclusively for peaceful purposes



International Safeguards

- **Safeguards inspections act as an alert system providing a warning of the possible diversion of nuclear material from peaceful activities.**



Video cameras in their secure housings used for remote monitoring of nuclear sites



Inspector conducting non destructive measurements

International Safeguards

- **The system relies on;**
 - **Material Accountability** - tracking all inward and outward transfers and the flow of materials in any nuclear facility. This includes sampling and analysis of nuclear material, on-site inspections, and review and verification of operating records
 - **Physical Security** - restricting access to nuclear materials at the site of use
 - **Containment and Surveillance** - use of seals, automatic cameras and other instruments to detect unreported movement or tampering with nuclear materials, as well as spot checks on-site



International Safeguards

- **In the five weapons states plus the non-NPT states (India, Pakistan and Israel), facility-specific safeguards apply to relevant plants.**
- **IAEA inspectors regularly visit these facilities to verify completeness and accuracy of records.**

South Africa's Nuclear Capabilities



- **IAEA Board of Governors proposed to suspend RSA's rights and privileges (June 1987)**
- **South Africa acceded NPT on 10 July 1991**
- **President F.W. de Klerk disclosed nuclear weapons program in 1993**
- **Influenced to extend the NPT indefinitely**

The ABACC Regional System



ABACC

- **The Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) is a binational agency created by the governments of Brazil and Argentina**
- **Responsible for verifying the peaceful use of all nuclear materials in all nuclear facilities of Brazil and Argentina**
- **Established through the Agreement for the Exclusively Peaceful Use of Nuclear Energy signed by Argentina and Brazil in 1991 to apply the Common System of Accounting and Control (SCCC)**

International Safeguards Problems 1980-90s

- **Iraq, Iran and North Korea illustrate both the strengths and weaknesses of international safeguards.**
- **While accepting safeguards at declared facilities, Iraq and Iran had set up elaborate equipment elsewhere in an attempt to enrich uranium to weapons grade.**
- **North Korea attempted to use research reactors (not commercial electricity-generating reactors) and a reprocessing plant to produce some weapons-grade plutonium.**

International Safeguards

- **While traditional safeguards easily verified the correctness of formal declarations, in the 1990s attention turned to what might not have been declared.**



International Safeguards – Additional Protocol

Strengthened safeguards:

- In 1993 a program was initiated to strengthen and extend the classical safeguards system
- A Model Protocol Additional to the Agreement (s) between States (s) and the IAEA (INFCIRC/540) was agreed by the IAEA Board of Governors in 1997
- Increased the IAEA's ability to detect undeclared nuclear activities, including those with no connection to the civil fuel cycle



International Safeguards – Additional Protocol

Innovations were of two kinds:

- **Some could be implemented on the basis of IAEA's existing legal authority through safeguards agreements and inspections.**
- **Others required further legal authority to be conferred through an Additional Protocol.**

International Safeguards – Additional Protocol

- **The Additional Protocol must be agreed by each non-weapon state with IAEA, as a supplement to any existing comprehensive safeguards agreement**
- **Weapons states have also (voluntarily) agreed to accept the principles of the Model Additional Protocol**

International Safeguards – Additional Protocol

Key elements of the Model Additional Protocol:

- **The IAEA is given considerably more information on nuclear and nuclear-related activities, including research and development (R&D), production of uranium and thorium (regardless of whether it is traded) and nuclear-related imports and exports.**
- **IAEA inspectors have greater rights of access. This will include any suspect location. It can be at short notice (eg. two hours), and the IAEA can deploy environmental sampling and remote monitoring techniques to detect illicit activities.**
- **States must streamline administrative procedures so that IAEA inspectors get automatic visa renewal and can communicate more readily with IAEA headquarters.**
- **As of mid 2007, 82 countries plus Taiwan had Additional Protocols in force; 39 more had them approved and signed.**

The UN Security Council

After September 11, 2001, the United Nations Security Council, acting under Chapter VII of the UN Charter, adopted resolutions that enforce control over nuclear materials and technology.



UNSC Resolution 1373



Shortly after the terrorist attacks to the U.S., the UN Security Council adopted Resolution 1373, which noted the close connection between international terrorism and illegal arms trafficking, and illegal movement of nuclear material, chemical, biological and other potentially deadly materials.

UNSC Resolution 1540

- **Precedents:
UNSC Resolutions 1373 (2001)
and 1377 (2001)**
- **Adopted on April 28, 2004.**
- **The latest in a series of internationally-directed, concrete measures aimed at:**
 - **Preventing Weapons of Mass Destruction proliferation**
 - **Preventing and countering terrorist acquisition and use of these deadly weapons**



United Nations Member States are required by international law to have laws and enforcement capacity for nonproliferation export controls and the protection and control of sensitive materials.

How to Guarantee Outreach and Measure Success?

- **UNSCR 1540:**

- ***Calls upon states to “adopt and enforce appropriate effective laws which prohibit any non-State actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes”.***

- **Acknowledges that some states may need help with establishing these systems, and invites more experienced states to provide their own national resources to help end shortcomings.**

How to Guarantee Outreach and Measure Success?

- **Paragraph 3a calls upon states to “*take and enforce effective measures*” to prevent activities relevant to non-state proliferation including developing controls over technology and material associated with the production, use, storage, or transport of nuclear weapons**
- **Ultimately, the goal is to specify and achieve overall effectiveness of a national system:**
 - **To account for and secure nuclear material and technology;**
 - **To account for activities listed under Annex I of the Additional Protocol;**
 - **To account for equipment and non-nuclear material specified under Annex II of the Additional Protocol.**

Final Remarks

- **Factors that underpin International Safeguards**
 - **Technical**
 - **Political**
 - **Economic**
 - **Social**
- **In the 1960s it was widely assumed there would be 30-35 nuclear weapons states by the turn of the century.**
- **In fact there were eight - a tremendous testimony to the effectiveness of the Nuclear Non-Proliferation Treaty (NPT) and its incentives both against weapons and for civil nuclear power.**

The End?