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Nuclear Nonproliferation

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Disclaimer

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The Nuclear Dilemma

With an explosion equivalent of about 20kT of TNT, the Trinity test was the first demonstration of a nuclear weapon. Conducted on July 16, 1945 in Alamogordo, NM this site is now a Registered National Historic Landmark.

The concept and applicability of nuclear power was demonstrated on December 20, 1951 with the Experimental Breeder Reactor Number One (EBR-1) lit four light bulbs. This reactor is now a Registered National Historic Landmark, located near Arco, ID.

From that moment forward it had been clearly demonstrated that nuclear energy has both peaceful and military applications and that the civilian and military fuel cycles can overlap. For the more than fifty years since the Atoms for Peace program, a key objective of nuclear policy has been to enable the wider peaceful use of nuclear energy while preventing the spread of nuclear weapons.

Volumes have been written on the impact of these two actions on the world by advocates and critics; pundits and practioners; politicians and technologists…The nations of the world have woven together a delicate balance of treaties, agreements, frameworks and handshakes that are representative of the timeframe in which they were constructed and how they have evolved in time. Collectively these vehicles attempt to keep political will, nuclear materials and technology in check. This paper captures only the briefest abstract of the more significant aspects on the Nonproliferation Regime.

Of particular relevance to this discussion is the special nonproliferation sensitivity associated with the uranium isotope separation and spent fuel reprocessing aspects of the nuclear fuel cycle.

Evolution of the Nonproliferation Regime

Atoms for Peace

http://www.eisenhower.archives.gov/All_About_Ike/Speeches/Atoms_for_Peace.pdf

In speech commonly know as the "Atoms for Peace" address, US President Dwight Eisenhower addressed the General Assembly of the United Nations on the Peaceful Uses of Atomic Energy on December 8, 1953. In this address Eisenhower sought to address

"the fearful atomic dilemma" by directing "the miraculous inventiveness of man" on peaceful uses of atomic energy.

In this talk, Eisenhower proposed:

- An international body where "the Governments principally involved….make contributions from their stockpiles of normal uranium and fissionable materials to an international Atomic Energy Agency…under the aegis of the United Nations….[This] Atomic Energy Agency could be made responsible for the impounding, storage, and protection of the contributed fissionable and other materials. The ingenuity of our scientists will provide special safe conditions under which such a bank of fissionable material can be made essentially immune to surprise seizure."
- Eisenhower challenged Congress to:

  "First, encourage world-wide investigation into the most effective peace time uses of fissionable material, and with certainty that they had all they had all the material needed for the conduct of all experiments that were appropriate;

  "Second, begin to diminish the potential destructive power of the world's atomic stockpiles;

  "Third, allow all people of all nations to see that, in this enlightened age, the great powers of the earth, both of the East and of the West, are interested in human aspirations first, rather than in building up the armaments of war;

  "Fourth, open up a new channel for peaceful discussion, and initiate at least a new approach to the many difficult problems that must be solved in both private and public conversations, if the world is to shake off the inertia imposed by fear, and is to make positive progress toward peace."

International Atomic Energy Agency (IAEA)

http://www.iaea.org/About/index.html

The IAEA was created by the "Statute of the IAEA" in 1957 in response to Eisenhower's call for an international body to promote peaceful use of nuclear energy. The main functions of the IAEA are to:

- Encouraged and assist research, development and practical application of atomic energy for peaceful uses throughout the world;
- Establish and administer safeguards designed to ensure that such activity assisted by the Agency is not used to further any military purpose;
- Apply safeguards to relevant activities at the request of Member States;
- Apply, under the Nuclear Non-Proliferation Treaty and other international treaties, mandatory comprehensive safeguards in non-nuclear weapon States Party to such treaties.

There are about 140 member states and the Secretariat is located in Vienna, Austria. The IAEA is an independent international agency related to the United Nations (UN) and reports annually to the UN General Assembly and to its Security Council, as needed.

Nuclear Non-Proliferation Treaty (NPT)

http://www.un.org/Depts/dda/WMD/treaty/

Then Nonproliferation Treaty is a multilateral, indefinite term-treaty whose obligations are:

- Nuclear weapon states (NWS) are not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices and not to assist, encourage, or induce any non-nuclear weapon states (NNWS) to manufacture or otherwise acquire them.
- NNWS are not to receive nuclear weapons or other nuclear explosive devices from any transferor, and not to manufacture or acquire them.
- NNWS must place all nuclear materials in all peaceful nuclear activities under IAEA safeguards.
- All Parties are obligated to facilitate and participate in the exchange of equipment, materials, and scientific and technological information for the peaceful uses of nuclear energy.
- All Parties must pursue negotiations in good faith on effective measures relating to the cessation of the nuclear arms race and to nuclear disarmament under strict and effective international control.

The NPT was signed on July 1, 1964 and entered into force on March 5, 1970. There are 189 parties to the Treaty. Three states – India, Israel, and Pakistan- have declined to sign the treaty and North Korea, who signed in 1985, withdrew from the treaty in 2003.

Zangger Committee

http://www.zanggercommittee.org/Zangger/default.htm

The Zangger Committee began work in 1971 to draft a list of items that would "trigger" IAEA safeguards if supplied by NPT parties to any non-nuclear weapons state. The list included:

- Source or special fissionable materials
- Equipment of materials especially designed or prepared for the processing, use, or production of special fissionable materials

And establishes three conditions of supply:

- A non-explosive use assurance
- An IAEA safeguards requirement
- A retransfer provision that requires the receiving state to apply the same conditions when re-exporting these items

The list was published in 1974 as IAEA INFCIRC/209. Since that time additional items have been added to the list:

- Heavy water production equipment
- Clarification on zirconium
- Isotope separation by the gas centrifuge process
- Clarification on reprocessing plants

- Clarification on isotope separation plant equipment from gaseous diffusion method

The Committee meets twice yearly.

Comprehensive Safeguards Agreements (CSA)

http://www.iaea.org/Publications/Factsheets/English/sg_overview.html

The Comprehensive Safeguard Agreements (INFCIRC/153) were established as "implementing instructions" to the NPT. They establish verification measures to assess the correctness and completeness of a State's declared nuclear material and nuclear-related activities. Permitted activities include on-site inspections, visits, and ongoing monitoring and evaluation. The principals involved are largely based on nuclear materials accountancy, complemented by containment and surveillance techniques, such as tamper-proof seals and cameras install by the IAEA.

Additionally the confidentiality of the information obtained by the IAEA is established. The CSA requires the protection of commercial and industrial secrets and requires the IAEA to regime, including classification levels, markings, and physical protection.

Additional Protocols (AP)

http://www.iaea.org/Publications/Factsheets/English/sg_overview.html

Further implementing instructions are set out in the Additional Protocol (AP) (INFCIRC/540) which established new legal authority for strengthened IAEA inspection capabilities. This protocol grants the IAEA expanded rights (complementary access) to provide assurances about both declared and undeclared activities. Included in this additional information is declaration of exempted, terminated, and pre-safeguards material; all activities at sites of nuclear facilities; and nuclear fuel cycle infrastructure not involving nuclear material. Inspectors are granted broader access on nuclear sites and access to information about a wider range of about nuclear materials.

The US has recently signed the AP and the articles will be deposited in Vienna. As of January 1, 2009 the AP will be in force domestically. The US is currently in the process of making its first declaration under this Protocol.

Nuclear Suppliers Group (NSG)

http://www.nsg-online.org/

The Nuclear Suppliers Group (NSG) intends to ensure that nuclear trade for peaceful purposes does not contribute to the proliferation of nuclear weapons or other nuclear explosive devices, while not hindering international trade and cooperation in the nuclear field. This is achieved by the implementation of two sets of guidelines (INFCIRC/254) for nuclear exports and nuclear-related exports. The first set of guidelines governs the export of items that are especially designed or prepared for nuclear use:

- Nuclear material

- Nuclear reactors and equipment
- Non-nuclear material for reactors
- Plant and equipment for the reprocessing, enrichment, and conversion of nuclear material and for fuel fabrication and heavy water production
- Technology associated with each of the above

The second set of guidelines governs the export of nuclear-related dual-use items and technologies, which could make a significant contribution to an unsafeguarded nuclear fuel cycle or nuclear explosive activity.

The NSG and the Zangger Committee differ in the content of their trigger lists, especially related to designed or prepared items and in the export conditions for the items on the lists. A major difference is the arrangement covering exports of dual-use items. Dual-use items cannot be defined as especially designed or prepared items and therefore, are outside the scope of the Zangger Committee's efforts but are an important part of the NSG guidance.

United Nations Security Council Resolution 1540

http://www.un.org/sc/1540/

Following the 9/11 terrorist attacks, the United Nations Security Council unanimously passed UNSCR 1540 in 2004. The resolution contained (among others) the following provisions:

"… Decides that all States shall refrain from providing any form of support to non-State actors that attempt to develop, acquire, manufacture, possess, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery…."

"…Decides also that all States, in accordance with their national procedures, shall 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…"

And calls upon States to:
"…To renew and fulfill their commitment to multilateral cooperation, in particular within the framework of the International Atomic Energy Agency, …, as important means of pursuing and achieving their common objectives in the area of non-proliferation and of promoting international cooperation for peaceful purposes…"

These activities have been extended in 2006 by UNSCR 1673 and in 2008 by UNSCR 1810.

Proliferation Security Initiative

http://www.state.gov/t/isn/rls/fs/105217.htm

The Proliferation Security Initiative was announced by US President Bush in May 2003. This initiative grew from the pursuit of new agreements on the search of planes and ships carrying suspect cargo and to seize illegal weapons or missile technologies.

The Initiative seeks to develop partnerships of states working together, employing their national capabilities to develop a broad range of legal, diplomatic, economic, military and other tools to interdict threatening shipments of WMD and missile-related equipment and technologies via air, land, and sea.

The goal of PSI is pre-emptive interdiction, which includes detaining and searching ships and aircraft as soon as they enter PSI members' territorial waters or national airspace.

Non-Compliance

http://www.iaea.org/NewsCenter/Focus/IaeaIran/index.shtml
http://www.iaea.org/NewsCenter/Focus/IaeaDprk/index.shtml
http://www.iaea.org/NewsCenter/Focus/IaeaIraq/index.shtml
http://www.iaea.org/NewsCenter/Focus/IaeaLibya/index.shtml

Challenges Ahead

Next Generation Safeguards Initiative

http://nnsa.energy.gov/news/2119.htm

NNSA/NA-20 Priorities

http://nnsa.energy.gov/nuclear_nonproliferation/index.htm

Hopefully, this paper has provided the reader with a brief insight into the scope, complexity and nuance of the Nonproliferation Regime. The Regime has its own life, with each aspect responding to daily changes in domestic and international political relationships; advances in technology; and the value, availability and uses of nuclear materials. The reader is guided to the vast depth and breadth of available literature to understand the concepts [1] presented here and many others.

[1] **Auspices Statement**
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