The Nuclear Non-Proliferation, Arms Control and Disarmament

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Conflict Prevention through Arms Control, Disarmament and Non-proliferation in the OSCE Area
Vienna International Center
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The Dawn

1938: Discovery of uranium fission: Lise Meitner & Otto Hahn

July 1945: Trinity Test
The Threat

6 Aug. 1945: “Little Boy”

The Hiroshima A-Bomb

9 Aug. 1945: “Fat Man”

The Nagasaki A-Bomb
The First Twenty-Five Years: Creation of the IAEA and its Safeguards System

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1945</td>
<td>US – 1st and only use of nuclear weapons</td>
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<tr>
<td>1946</td>
<td>USSR NW test</td>
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<tr>
<td>1949</td>
<td>USSR NW test</td>
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<tr>
<td>1952</td>
<td>UK NW test</td>
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<td>1953</td>
<td>“Atoms for Peace” Proposal</td>
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<td>1957</td>
<td>EURATOM established</td>
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<td>1960</td>
<td>IAEA established</td>
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<td>1961</td>
<td>France NW test</td>
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<td>1964</td>
<td>China NW test</td>
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<td>1965-68</td>
<td>Expansion of SG system (INFCIRC/66, Rev.1 &amp; Rev.2)</td>
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<td>1967</td>
<td>Latin American NWFZ Treaty opened for signature</td>
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<td>1968</td>
<td>NPT opened for signature</td>
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**UNGA resolution 1:** Atomic Energy Commission

**Baruch Plan**

**1st IAEA SG system (INFCIRC/26)**
Challenges of the 1950’s – 60’s

Perceived Risk?

Misuse of supplied material and items

Exercise unilateral restraint in sharing technology

AND

Create independent international verification body

AND

Develop system for verifying use of supplied material and items
Early Efforts

- UN General Assembly resolution I/1 (1946): UN Atomic Energy Commission
- 1946: Acheson-Lilienthal Report; Baruch Plan
  - International ownership and operation of “dangerous” nuclear activities: Atomic Development Agency
  - US to give up nuclear weapons after controls in place
- UN AEC effectively defunct by 1949 with nuclear test by USSR
SURE—AND HOW ABOUT ALL THOSE OTHER THINGS...

"ATOMIC FLYING MACHINES ON MY BACK."

"ATOMIC ROCKETS TO THE MOON."

"ATOMIC 'PILLS' TO RUN OUR AUTOS FOR YEARS."

"ATOMIC DISINTEGRATOR GUNS."

HOLD ON, JOHNNY... YOU'VE BEEN READING TOO MANY COMICS!
The IAEA: Atoms for Peace

- US “Atoms for Peace” proposal in UNGA – 1953
- Statute of the IAEA in force 1957
- Autonomous inter-governmental organization
- Unique relationship with UN Security Council
- Not a UN organization
- 170 Member States
- Authority to implement safeguards
IAEA safeguards

- Membership in IAEA does not require acceptance of safeguards

- IAEA safeguards possible in non-Members (and in non-States)
  - DPRK
  - Taiwan, China

- Requires consent of State
  - Voluntary undertaking
  - Security Council Chapter VII
  - Safeguards Agreement
Types of safeguards agreements

- **Item Specific (INFCIRC/66-type)**
  - India, Israel and Pakistan

- **Voluntary Offer Agreements (VOAs)**
  - The 5 NPT NWSs: China, France, Russia, UK, US

- **Comprehensive Safeguards Agreements (CSAs) (INFCIRC/153-type)**
  - In force for 175 of the 186 NNWSs
Critical Path to Weapons-Usable Material

- **Mining** → **Ore Concentration**
- **Ore Concentration** → **Conversion**
- **Conversion** → **Fuel Fab.**
- **Fuel Fab.** → **Reactors and CAs**
- **Reactors and CAs** → **Reprocessing**
- **Reprocessing** → **Spent Fuel Storage**
- **Spent Fuel Storage** → **PU**
- **Fuel Fab.** → **Enrichment**
- **Enrichment** → **HEU**
- **HEU** → **WEAPONIZATION**

*Nuclear-related infrastructure: research centers and laboratories without nuclear material*
SG Coverage: Item-Specific Agreements

Nuclear-related infrastructure: research centers and laboratories without nuclear material

Mining → Ore Concentration → Conversion → Fuel Fab. → Reactors and CAs → Reprocessing

Heavy Water Production

Spent Fuel Storage

PU

HEU → WEAPONIZATION
International Arms Control: First Steps

- **1960**: Ten Nation Committee on Disarmament
  - Comprehensive approach to disarmament; equal East/West representation
- **1961-1969**: Eighteen-Nation Disarmament Committee
  - Addition of Non-Aligned countries
- **October 1963**: Partial Test Ban Treaty in force
- **October 1964**: China conducts nuclear test
Regional Arms Control: First Steps

- 1958: Costa Rica proposes regional arms control agreement
- **October 1962:** Cuban Missile Crisis
- **April 1963:** Declaration of Denuclearization of Latin America
- **February 1967:** Treaty of Tlatelolco opened for signature
1967 Tlatelolco Treaty
- Non-proliferation and peaceful use undertakings
- IAEA safeguards on all nuclear activities
- Ban on NW testing
- OPANAL
- Protocols:
  - States with territories in the zone
  - NWSs – negative security assurances
International Arms Control: Next Steps

The NPT

- Eighteen-Nation Disarmament Committee, Geneva 1965-1967
- Bilateral US/USSR negotiations
- August 1967: US/USSR identical drafts
- Opened for signature 1968
- Entered into force 5 March 1970
The Following Two Decades: The Comprehensive Safeguards System
Challenges of the 1970’s – 80’s

Perceived Risk?

Misuse of *indigenous* nuclear fuel cycle

Develop safeguards system for verifying *supplied and produced* nuclear material in a State

AND

Require *export controls* for nuclear material and specialized *single use* equipment and material
The NPT: Three Pillars

Non-Proliferation

Peaceful Uses

Disarmament
The NPT

**Nuclear-Weapon States (NWSs)**
• Not to provide nuclear weapons or nuclear explosive devices to NNWSs (Art. I)

**Non-Nuclear-Weapon States (NNWSs)**
• Not to acquire nuclear weapons or other nuclear explosive devices (Art. II)
• Accept safeguards on all nuclear material (Art. III.1, 4)

**All States Parties**
• Export controls: nuclear material; single use items (Art. III.2)
• Facilitate exchange of technology (Art. IV.2)
• Pursue negotiations on nuclear disarmament (Art. VI)
The Structure and Content of Agreements between the Agency and States required in connection with the Treaty on the Non-Proliferation of Nuclear Weapons

INFCIRC/153 (Corr.)
... to accept safeguards, in accordance with the terms of the Agreement, on all source or special fissionable material in all peaceful nuclear activities within the territory of the State, under its jurisdiction or carried out under its control anywhere ...

INFCIRC/153, para. 1
Timely detection of diversion of significant quantities of nuclear material to “the manufacture of nuclear weapons or of other nuclear explosive devices or for purposes unknown”

Deterrence of diversion by risk of early detection
Routine SG Coverage - CSAs

- Mining
- Ore Concentration
- Conversion
- Fuel Fab.
- Reactors and CAs
- Reprocessing
- Spent Fuel Storage
- Heavy Water Production
- Enrichment

Nuclear-related infrastructure: research centers and laboratories without nuclear material

- HEU
- WEAPONIZATION
1985 - Treaty of Rarotonga
- Non-proliferation & peaceful use undertakings
- Comprehensive safeguards as a condition of supply
- Ban on dumping of radioactive waste

3 Protocols:
- States with territories in zone
- Negative security assurances
- No testing of nuclear explosives
Export Controls – NPT & Non-NPT

**Zangger Committee (1971) – NPT suppliers**

- Trigger List (1974) – Nuclear material and single use items triggering safeguards
  
  *(INFCIRC/209)*

**Nuclear Suppliers Group (1975) – All major suppliers**

- List of single use items and related technology (1978)
  
  *(INFCIRC/254)*
Limitations in Traditional SG

- Limited routine *access* – frequency and locations
- Little attention to *small quantities* of material
- Focus on declared materials *(correctness)*
- No assurances of absence of undeclared nuclear material and facilities *(completeness)*
Limitations in Export Controls

Limited **scope and conditions:**

- No requirement for full-scope SG
- No controls on dual-use items or items relevant to weaponization

Limited **information exchange:**

- No procedures for exchanging information on export denials
- No provision of information to the IAEA

**Informal, non-binding**
1990: The War That Changed Everything
The Next Decade: Strengthening Safeguards

IAEA discovery of Iraq's nuclear weapons programme

DPRK: NPT SGA enters into force

South Africa: declares dismantled 6 weapons

DPRK: non-compliance; report to UNSC

South-East Asian NWFZ Treaty

DPRK: non-compliance; report to UNSC

“93+2” to Board

African NWFZ Treaty

CTBT

India, Pakistan NW tests

6th NPT Review Conf.

1991
1992
1993
1993
1993
1994
1995
1995
1996-7
1998
2000

1991
1991
1992
1993
1993
1993
1994
1995
1995
1996-7
1998
2000

Iraq: UNSC res. 687

South Africa concludes NPT SGA

IAEA's Programme 93+2 initiated

DPRK: IAEA detects inconsistencies

US/DPRK Agreed Framework

NPT extended indefinitely

Model Additional Protocol approved (INFCIRC/540)

Iraq: IAEA inspectors withdrawn

Model Additional Protocol approved (INFCIRC/540)
TUWAITHA
Clandestine Nuclear Weapons Activities

Weaponization explosives; neutron initiator

Planned U metal production

Clandestine isotope irradiation

EMIS activities

U metal production

R&D UF4 & UF6 production

Undeclared reprocessing

Laser enrichment research & support

Theoretical weaponization activities

Weaponization: theoretical computations

Chemical enrichment R&D

Tritium activities, HEU recovery (crash programme)

UCL4 production lab
Challenges of the 1990’s

Perceived Risk?

Undeclared nuclear material and activities

Ensure verification of all nuclear material and activities: declared and the absence of undeclared

AND

Expand export controls to cover dual use items
... the Agency’s right and obligation to ensure that safeguards will be applied ... on ALL source or special fissionable material in all peaceful nuclear activities within the territory of the State, under its jurisdiction or carried out under its control anywhere ...
Redefined Objective

Assurances of Correctness and Completeness of a State’s Declarations
1991-1997: Challenging Years
Model Protocol Additional to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards

INFCIRC/540 (Corr.)
SG Coverage – CSA and AP

- Mining
- Ore Concentration
- Conversion
- Enrichment
- Fuel Fab.
- Reactors and CAs
- Reprocessing
- Heavy Water Production
- Spent Fuel Storage
- Pu

Nuclear-related infrastructure: research centers and laboratories without nuclear material

HEU

WEAPONIZATION
Export Control Developments

**INFCIRC/254:**
- Part 1 (1978): “EDP” items, and technology transfer
- Part 2 (1992): Dual-use equipment, material & technology
- Conditions:
  - “Full scope” SG as condition for future supplies (1992)
  - Exchange within NSG of notifications of denials

**INFCIRC/539 (Rev.6): Outreach activities**
3rd NWFZ: South East Asia

1995 – Bangkok Treaty

- Non-proliferation & peaceful use undertakings
- Comprehensive safeguards as a condition of supply
- Ban on dumping of radioactive waste

Protocol:

- Negative security assurances – not to use or threaten to use nuclear weapons in the zone
1996 – Pelindaba Treaty
- Non-proliferation & peaceful use undertakings
- Prohibits nuclear weapons research
- Requires nuclear weapons programme rollback
- Prohibits attacks on nuclear facilities
- 3 Protocols:
  - Negative security assurances
  - No testing nuclear explosives
  - States with territories in zone
U.S. ATTACKED
HIJACKED JETS DESTROY TWIN TOWERS
AND HIT PENTAGON IN DAY OF TERROR

President Vows to Exact
Punishment for ‘Evil’

By MURG SCHLUHMANN

Hijackers veered jetliners into each of New York’s World Trade Center towers yesterday, toppling both in aKidsown of steel, glass, smoke and leaping victims, while a third jetliner crashed into the Pentagon in Virginia. There was no official count, but President Bush said thousands had perish, and in the immediate aftermath the nation was already being ranked the worst and most monstrous terror attack in American history.

The attacks seemed carefully coordinated. The hijackers were all on planes to California, and they�� tossed with not, and their departures were spaced within an hour and 60 minutes. The first, American Airlines Flight 11, a Boeing 767 out of Boston for Los Angeles, crashed into the north tower at 8:46 a.m. Eighteen minutes later, United Airlines Flight 175, also headed from Boston to Los Angeles, slammed into the south tower.

Then an American Airlines Boeing 757, Flight 77, left Washington’s Dulles Inte
The Last Decade

Iraq: IAEA resumes SC inspections 2002

DPRK rejects Agreed Framework; expels IAEA inspectors 2002

IRAN: non-compliance reported to SC 2002

IRAN: discovery of undeclared enrichment programme 2003

LIBYA: NW programme 2003

ROK/Egypt: undeclared nuclear activities 2003

PSI: 7th NPT Rev. Con. 2003

UNSC resolution 1540: non-State actors 2004

DPRK: IAEA returns 2006

US/India Deal 2006

DPRK: IAEA returns 2006

N. Terrorism Convention 2005

UNSC resolution 1887 2006

DPRK announces NW test 2007

DPRK: enrichment programme for weapons 2001

9/11 2002

Syria: bombing of Dair Alzour 2009

UNSC resolution 1540: non-State actors 2004

DPRK: IAEA returns 2006

EIF of Pelindaba & CANWFZ Treaties 2009

UNSC resolution 1887 2006

DPRK announces NW test 2007

DPRK: enrichment programme for weapons 2001

9/11 2002
Challenges of the Last Decade

Perceived Risk?
Non-State actors & radiological dispersal devices

Improve physical *security* of nuclear material & facilities and other radioactive materials

AND

Ensure effective *domestic & trans-border controls*
Safeguards vs. Security

- **Nuclear safeguards:**
  - Detection and deterrence of diversion of *nuclear material* by a *State*

- **Nuclear security:**
  - Detection and deterrence of misuse of *nuclear material & other radioactive substances* by *non-State actors*
2002-2009: More Challenges
Nobel Peace Prize – 2005
5th NWFZ: Central Asia

2006 – Semipalatinsk

- Non-proliferation & peaceful use undertakings
- Requires a CSA & AP
- Bans testing of nuclear weapons or nuclear explosive devices
- Environmental rehabilitation of territories contaminated due to past activities

Protocol:
- Negative security assurances: not to use or threaten to use nuclear weapons
Single State NWFZ: Mongolia

1992 Mongolia NWFZ
- 1992 – Declared itself a single-State NWFZ
- 1998 – UN General Assembly recognized NWFZ status
- 2000 – Mongolia law on its NWFZ status
- 2012 – Declaration with NWSs on nuclear weapon free status & negative security assurances to Mongolia
56% of Earth’s land area of 149 million km²; 60% of 195 States; 39% of world’s population
The Present and Beyond ...

1st Nuclear Security Summit

Iran Report - PMD

Syria reported to UNSC

Iran Deal (JCPOA)

Treaty on Prohibition of Nuclear Weapons

Future of JCPOA?

8th NPT Rev. Con.

Fukushima Daiichi Accident

DPRK’s 3rd nuclear weapon test

DPRK’s 4th & 5th nuclear weapon tests

DPRK’s 6th nuclear weapon test

9th NPT Rev. Con.

2010

2010

2011

2013

2015

2016

2017

2018

2010
Middle East WMD Free Zone?

- **1995 NPT Review & Extension Conference:**
  - resolution on WMD zone free in Middle East

- **2010 NPT Review Conference breakthrough:**
  - UN SG to convene conference in 2012
  - Facilitator appointed
  - No conference convened

- **2015 NPT Review Conference: extremely contentious**
  - Middle East WMD free zone
  - Disarmament
2010 NPT Review Conference

- Expressed deep concern at “catastrophic humanitarian consequences” of use of nuclear weapons; reaffirmed need for States to comply with applicable international law, including humanitarian law

Humanitarian Conferences:

- Oslo, 2013; Nayarit, 2014; Vienna, 2014
- Humanitarian Pledge, 2015 – 117 States
- Open Ended Working Group, 2016 – 3 sessions
- UN 1st Committee resolution, 2016
- Negotiations – March, June, July 2017
Treaty on the Prohibition of Nuclear Weapons

20 September 2017

- Joint Comprehensive Plan of Action (JCPOA)
  - 14 July 2015

- Roadmap for Clarification:
  - Past & present outstanding SG issues - 15 Dec. 2015

- Implementation Day

- US withdrawal
  - 8 May 2018
Challenges of New Millennium?

Perceived Risks:

**Nuclear black markets** – non-State actors

**US/Russian relations** – a new Cold War?

**Disarmament slowdown** – failure of NWSs to fulfil obligations under Article VI of the NPT

**JCPOA** - possible collapse

**DPRK** – ???

And the implications for the **2020 NPT Review Conference** …..