The Abdus Salam
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United Nations
Educational, Scientific and
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IAEA
International Atomic Energy Agency

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Joint ICTP-IAEA School of Nuclear Energy Management

8 - 26 August 2011

Introduction to the IAEA – history, structure, roles.

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Nuclear Energy Management School, Trieste , August, 2011,

Yanko Yanev, Director of the NEM School

Nuclear Energy and the IAEA

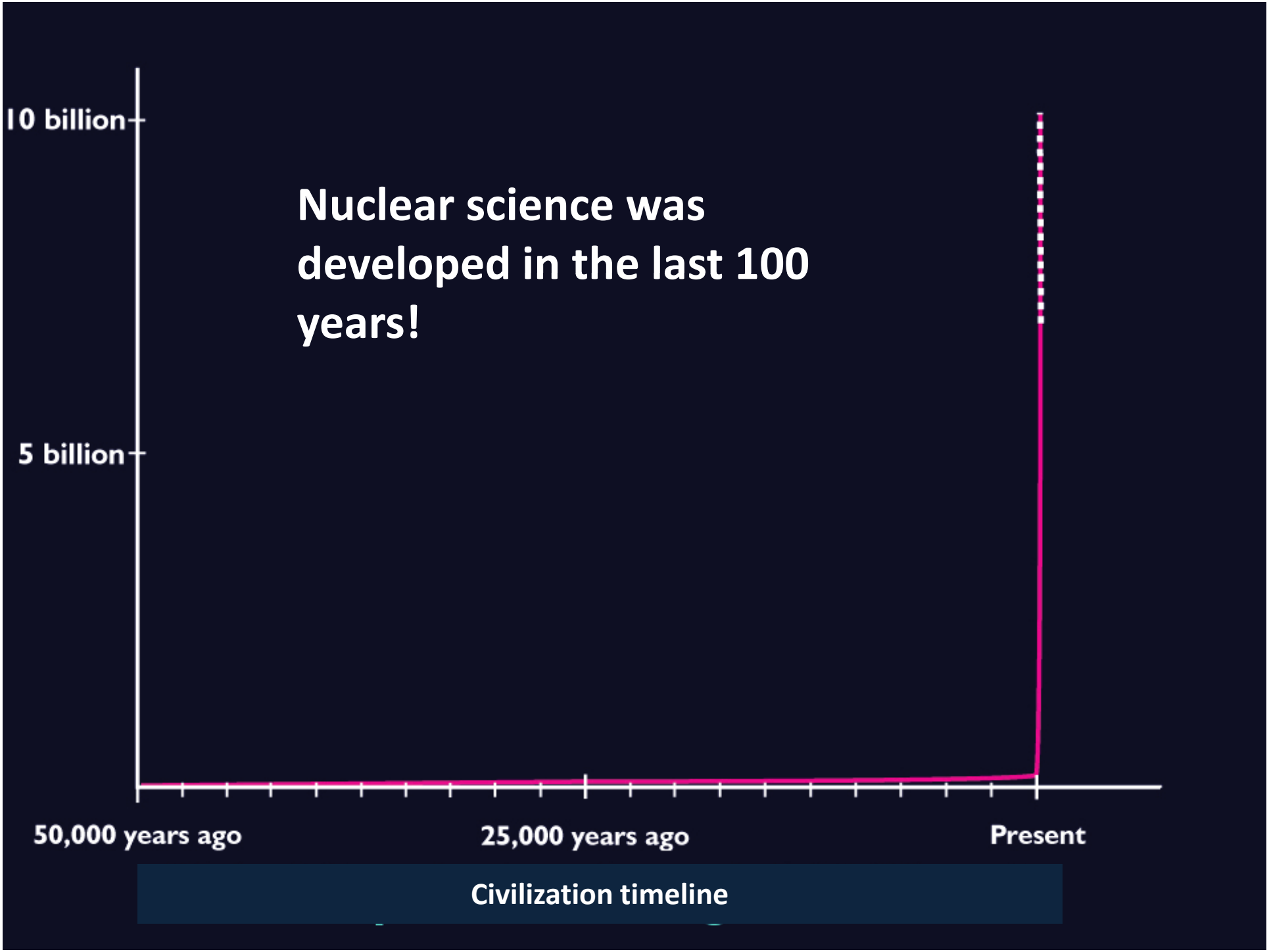
SOCIETY HISTORY LINE

Universe was created 12 -15 billion years ago.

Life on Earth began nearly 4 billion years ago.

Hominids appeared 7 million years ago.

Homo sapiens developed 50,000-100,000 years ago.


10 billion
5 billion
Nuclear science was developed in the last 100 years!
50,000 years ago
25,000 years ago
Present
Civilization timeline

Nuclear Science History

Pierre Curie

In 1898, French physicist Pierre Curie and his wife Maria Sklodowska-Curie had discovered that present in pitchblende, an ore of **uranium**, was a substance which emitted large amounts of radioactivity, which they named **radium**.

Marie Curie, Sklodowska

Nuclear Science History

In 1917

Ernest Rutherford the father of nuclear physics, is credited with splitting the atom.

In 1932

John Cockcroft and **Ernest Walton**, attempted to split the **atomic nucleus** by entirely artificial means, using a particle accelerator to bombard **lithium** with protons, thereby producing two helium nuclei.

Ernest Rutherford

Reference :Wikipedia

Nuclear Science History

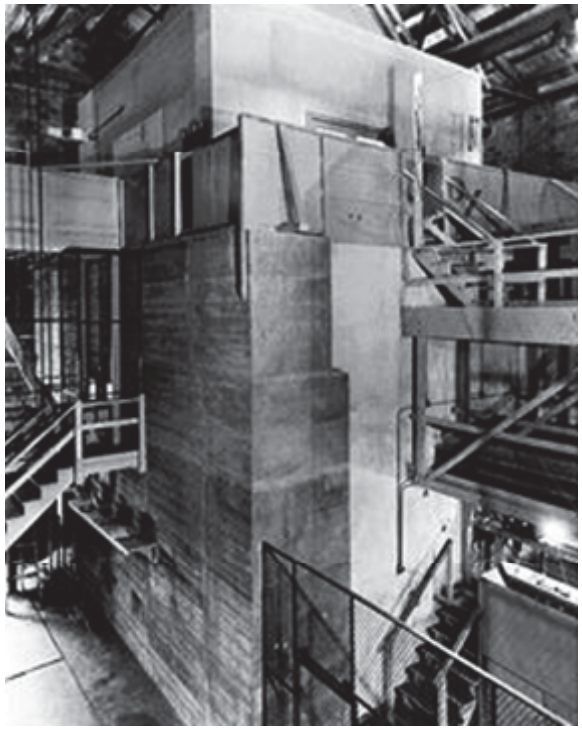
In 1932 James Chadwick discovered the neutron.

In 1934 nuclear fission was first experimentally achieved by **Enrico Fermi** In Rome, when his team bombarded uranium with neutrons.

In 1938, German chemists **Otto Hahn** and **Fritz Strassmann**, along with Austrian physicists **Lise Meitner** and **Otto Robert Frisch**, conducted experiments with the products of neutron-bombarded uranium.

Nuclear Science History

In the United States - the first man-made reactor, known as Chicago Pile-1, which achieved criticality on **December 2, 1942**. This work became part of the Manhattan Project, which built large reactors at the Hanford Site to breed plutonium for use in the first nuclear weapons, which were used on the cities of Hiroshima and Nagasaki.



The bomb…

photo taken at ground level of Nagasaki bombing

THE FORTIES &THE TERRIBLE SWORD

- **1945**

During the final weeks of the Second World War, the **United States tests the first atomic bomb** in Los Alamos,New Mexico, in July.

In August, the **USA explodes two atomic bombs on Hiroshima and Nagasaki**, marking nuclear energy's destructive debut.

Second World War ends.

- **1946**

"Cold War" begins to unfold.

The United Nations Atomic Energy Commission (UNAEC) is formed (representatives from USA, USSR, Canada, United Kingdom, others) in efforts to seek solutions.

- **1946**

US delegation to UNAEC proposes Baruch Plan with the Soviet delegation later presenting an alternative proposal.

- **1949**

The Soviet Union carries out its first nuclear weapons test, signalling arms race and effectively ending UNAEC's role.

THE FIFTIES &ATOMS FOR PEACE

- **1955**

UN General Assembly formally dissolves the UNAEC, which had been inactive since July 1949. In October, theUK tests a nuclear weapon. The USA tests the first hydrogen bomb in November.

- **1955**

”Atoms for Peace” speech by US President Eisenhower before UN General Assembly. Its main proposal calls for “the governments principally involved” (naming the USA and Soviet Union) to make joint contributions from their stockpiles of normal uranium and fissionable materials to an international atomic energy agency set up under the UN. Among the agency’s responsibilities would be to store and safeguard The material and to “devise methods” whereby it would be allocated to serve the “peaceful pursuits of mankind”.

THE FIFTIES & ATOMS FOR PEACE

1955

In Washington, DC, work begins on drafting the Statute of the International Atomic Energy Agency (IAEA) with the participation of governmental representatives from Australia, Belgium,Canada, France, Portugal, South Africa, United Kingdom, and USA. Later, in early 1956, group expands to twelve with representatives from the USSR, Czechoslovakia, India, and Brazil.

1955

Beneficial uses of nuclear power are showcased at the UN's First International Conference on Peaceful Uses of Nuclear Energy in Geneva, a landmark scientific meeting of more than 1500 delegates. Dr.Homi Bhabha, the eminent Indian physicist, serves as President.

1956

In New York, States approve the Statute of the IAEA at conference of 82 States at the UN. It incorporates responsibilities for both the control and development of nuclear energy for exclusively peaceful purposes.

THE FIFTIES & ATOMS FOR PEACE

1957

The Agency's Preparatory Commission begins work in February toward the first General Conference in October.The IAEA Statute enters into force 29 July, by which time 26 States had deposited their instruments of ratification. In October, delegates from 59 States attend the first General Conference of the IAEA in Vienna, Austria, for three weeks. They appoint Sterling Cole, from the United States, as first Director General and approve $4.1 million programme of activities. Mr. Cole assumes post, after the interim term as Acting Director General of the Preparatory Commission’s Executive Director, Paul Jolles of Switzerland. The former Grand Hotel on Vienna's Ringstrasse is selected as the temporary headquarters of the Agency. ***Board of Governors:*** Dr. Pavel Winkler, of Czechoslovakia, is elected as the IAEA's first Board Chairman. As provided by the Agency's Statute, the first Board includes 23 Member States: Argentina, Australia, Brazil, Canada, Czechoslovakia, France, Guatemala, India, Indonesia, Italy, Japan, Korea, Pakistan, Peru, Portugal, Romania, Sweden, Turkey, Union of South Africa, USSR, United Arab Republic (Egypt),United Kingdom, and USA.

Regional nuclear bodies: In March, six European countries sign the "Rome treaties" establishing the European Atomic Energy Community (Euratom) and the Common Market. In December, countries agree to set up the European Nuclear Energy Agency of the Organization for European

THE IAEA

- is an independent intergovernmental, science and technology-based organization, in the United Nations family, that serves as the global focal point for nuclear cooperation;
- assists its Member States, in the context of social and economic goals, in planning for and using nuclear science and technology for various peaceful purposes, including the generation of electricity, and facilitates the transfer of such technology and knowledge in a sustainable manner to developing Member States;
- develops nuclear safety standards and, based on these standards, promotes the achievement and maintenance of high levels of safety in applications of nuclear energy, as well as the protection of human health and the environment against ionizing radiation;
- verifies through its inspection system that States comply with their commitments, under the Non-Proliferation Treaty and other non-proliferation agreements, to use nuclear material and facilities only for peaceful purposes

THE FIFTIES & ATOMS FOR PEACE

1958

The IAEA initiates its technical assistance programme with a modest fund of $125,000 — which includes $2.01 a New York school boy and his classmates voluntarily contributed to the IAEA.

1959

In February, the issue of liability for nuclear accidents appears on the global agenda. IAEA and World Heath Organization (WHO) jointly sponsor the Agency's first scientific meeting, with thirty-eight experts from 22 countries attending the seminar on medical radioisotope scanning.

In April, the first edition of the *IAEA Bulletin,* the International Atomic Energy Agency's quarterly journal, is published. By mid-year, the IAEA becomes a scientific publisher, having issued nine.

In the Soviet Union, the first nuclear powered ship, the *Lenin*, is built.

THE SIXTIES &THE RISING HOPES

1960

The Agency awards its **first research grant** to an Indian scientist for research at the Massachusetts Institute of Technology in the USA on solid state physics. In April, the IAEA Board of Governors adopts the Agency's **official emblem and seal**. In October, the Agency begins publication of its first scientific periodical, the quarterly *Nuclear Fusion* journal.

1961

Dr. Sigvard Eklund from Sweden, a physicist who served as Secretary General of the 1958 UN Conference in Geneva, is appointed as the IAEA's second Director General. **The scientific and technical character of the Agency** comes more sharply into focus**. First nuclear inspections** under IAEA safeguards system take place at a research reactor in Norway**. The IAEA's Laboratory** opens in Seibersdorf, Austria, near Vienna, opening a novel channel for cooperative global nuclear radioisotopes in medical, agricultural, industry, and other fields.

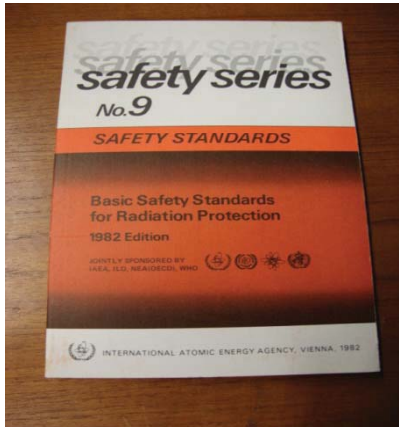
Nuclear-weapon-free zone: At a time when atmospheric testing nuclear bombs is growing to average more than one explosion per week, States adopt the Antarctic Treaty, the first regional approach to non-proliferation.

Environment: The IAEA and World Meteorological Organization (WMO) initiate a joint global network for surveying the content of hydrogen and oxygen isotopes in precipitation, which serves to monitor tritium releases associated with nuclear testing and today is widely used in studies of water cycles and global climate change.

THE SIXTIES &THE RISING HOPES

1962

In May, the IAEA convenes its first major symposium on nuclear reactor safety, reviewing the safety picture from the global perspective. In June, the IAEA Board approves the Agency's *Basic Safety Standards for Radiation Protection*, upon which countries can, and do, base their national standards and regulations (subsequent editions, the latest in 1994, update the standards).



1963

The USA and Soviet Union, in the aftermath of the Cuban crisis, begin to seek common ground in areas of nuclear arms control. The Partial Nuclear Test Ban Treaty is negotiated, co-sponsored by the USA, Soviet Union, and UK. It bans nuclear tests in the atmosphere, underwater, and in outer space. The IAEA safeguards system is extended to large reactors, an important step in the internationalization of bilateral safeguards agreements.

1964

The Oyster Creek nuclear plant in the USA is built for electricity generation at price many countries find affordable. It heightens interest in nuclear power plants for electricity generation. In Trieste Italy, the IAEA inaugurates the International Centre for Theoretical Physics, which serves as a research and training centre for scientists from developing countries.

THE SIXTIES &THE RISING HOPES

1967

The Tlatelolco Treaty for the Prohibition of Nuclear Weapons in Latin America opens for signature (enters into force 25 April 1969) in Mexico. It establishes a nuclear-weapon-free zone covering Latin America and the Caribbean. Requires comprehensive IAEA safeguards. A year later, Mexico becomes the first country to place its entire nuclear programme under IAEA safeguards in accordance with the Treaty.

1968

An idea that Ireland first formally proposed as early as 1958 bears fruit: following extensive negotiations, the **Treaty on the Non-Proliferation of Nuclear Weapons** (NPT) is finalized and opens for signature. It essentially freezes the number of declared nuclear-weapon States at five (USA, Soviet Union (now Russia), UK, France, China), who are obligated to make “good faith” efforts toward disarmament.
Other States grouped as non-nuclear weapon States, who are required to forswear the nuclear weapons option and to conclude comprehensive safeguards agreements with the IAEA on their nuclear materials. The Treaty provides for these States to receive assistance for the transfer of technology for peaceful applications of nuclear energy.

N P T

1969

Nuclear power serves as an energy source during the historic Apollo missions, as three astronauts place an atomic generator on the moon.

THE SEVENTIES &THE DUAL CHALLENGE

1970

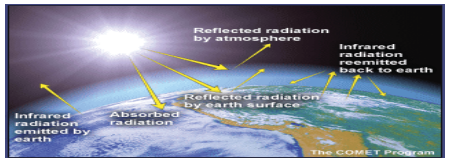
The IAEA sets up a Safeguards Committee to advise the Agency on its responsibilities under the NPT, which enters into force in March. In May, the IAEA begins operating the bibliographic reference database, the International Nuclear Information System (INIS), with participating Member States the growth and cost.

1971

The Zangger Committee (named after Swiss Prof.Claude Zangger) is formed, composed of NPT States engaged in major exports of nuclear plant equipment or materials, in efforts to interpret NPT provisions related to exports of nuclear material. Committee draws up trigger list of items whose export would require IAEA. Finland becomes the first country to sign an NPT safeguards agreement with the IAEA.

1972

UN Conference on the Human Environment is held in Stockholm. Discussions include nuclear energy's environmental benefits;“greenhouse effect”. The IAEA starts a two-year “market survey” to assess nuclear power prospects in developing countries, with a focus on the demand for smaller-sized power reactors, and launches its first agreement for standing regional technical cooperation in the nuclear field, the Regional Cooperative Agreement (RCA) for Asia and the Pacific, which today has 17 participating countries.



1973

In April, the IAEA and Euratom sign an agreement for the implementation of safeguards provisions under the NPT, a major step forward in international verification.

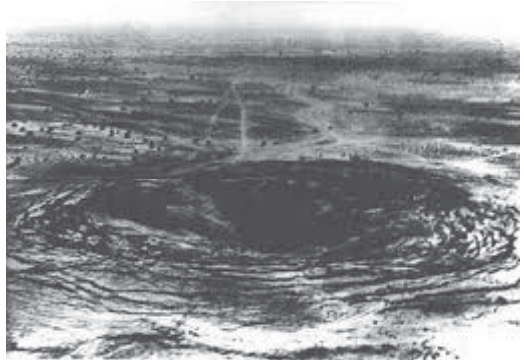
THE SEVENTIES &THE DUAL CHALLENGE

1973

The oil crisis puts energy issues at the top of the global agenda and prices quadruple. Nuclear power prospects initially brighten, then wane as high energy prices change economic conditions and lead to energy measures to slow demand.

1974

With the first NPT review conference nuclear safeguards and non-proliferation issues rise higher on global agenda. On 18 May, India explodes what it describes as a “peaceful” nuclear device in tests. In the United States, steps are taken to reinforce the non-proliferation regime and policy on nuclear exports, a process leading to review of nuclear fuel cycles from the standpoint of proliferation.



1975

In London the US and other major suppliers of nuclear materials from industrialized countries meet secretly for the first time to draw up new rules for nuclear exports. The meeting follows discussions in Moscow in late 1974 between the USA and Soviet Union on the establishment of such a group, which would come to be called the "London Club".At the IAEA’s Seibersdorf Laboratories, construction is completed on special facilities for the Safeguards Analytical Laboratory, the coordinating centre of a global network of analytical laboratories for analyzing samples of plutonium, uranium, and other materials.

THE SEVENTIES &THE DUAL CHALLENGE

1977

In September, the Nuclear Suppliers' Group reaches **agreement on export controls of sensitive nuclear technology,** issuing a list called the **“London Guidelines”.** (Fifteen years later, after the Iraqi case, the Group agreed to require full-scope IAEA safeguards as a condition of supply to non-nuclear-weapon States.)

1979

Opening of Vienna International Centre along the Danube. The IAEA moves to new headquarters from downtown Vienna.

In the United States, headlines report a nuclear power plant accident on 28 March at **the Three Mile Island** site, near Harrisburg, Pennsylvania Becomes the **first nuclear plant accident to draw extensive international attention.** Post-accident studies report negligible radiation releases. The accident causes no loss of life or injury, but leaves the nuclear unit destroyed, and the utility with extensive and lengthy clean up operation at costs estimated at exceeding $1 billion. In Vienna, an IAEA expert group is formed and establishes guidelines on emergency planning and response.

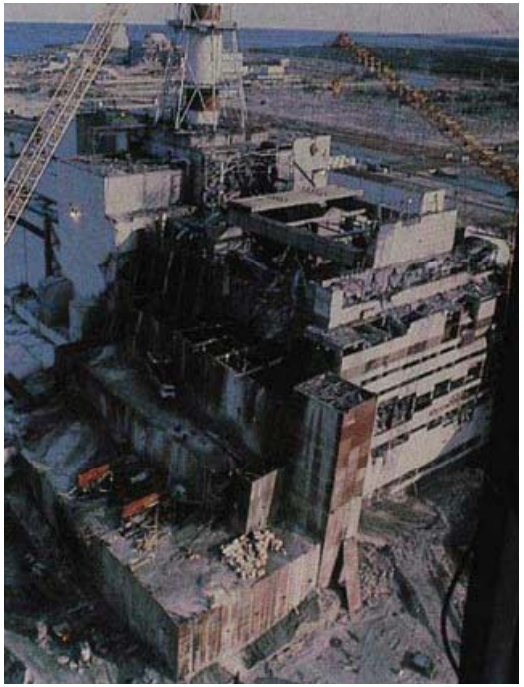
THE EIGHTIES &THE CHANGING AGENDA

1980 - 1985

- Two issues issues dominate: nuclear supplies and a nuclear test ban.
- At the IAEA, Member States create the Committee on Assurances of Supply (CAS) to establish procedures in global nuclear commerce and cooperation of transfers for peaceful uses in line with non-proliferation aims.
- The Agency launches the Power Reactor Information System, a computerized database that becomes the world's most authoritative source of nuclear power status and trends.
- In September, the General Conference appoints Dr.Hans Blix, former Minister of Foreign Affairs in Sweden, as Director General for an initial term of four years beginning in December 1981.
- China joins the IAEA, as part of its policy of opening to the international community.
- A landmark IAEA Conference on Radioactive Waste Management is convened in Seattle, USA, at which international experts agree that the technology is available for the safe disposal of radioactive waste.
- At the Third Review Conference of the NPT in Geneva, Parties do not adopt a final declaration because of disagreement on key issues related to disarmament and the transfer of peaceful nuclear technologies. In November, the first summit meeting takes place between newly elected leader of the Soviet Union,Mikhail Gorbachev and US President Ronald Reagan.

THE EIGHTIES &THE CHANGING AGENDA

1986 – Chernobyl



- On 26 April, a disastrous nuclear power plant accident at the Chernobyl site in the USSR destroys unit-4 of the reactor, causes deaths and injuries, and releases radiation across national boundaries; it is first internationally detected and reported by experts in Sweden and Finland.
- In August, the IAEA becomes the site for post accident review conference, which provides the world's first authoritative account of the accident.
- Analytical services of the IAEA's Laboratories in Vienna, Seibersdorf and Monaco are mobilized to support assessments of Chernobyl's radiological impact. In September, following work of preparatory groups of experts, IAEA Member States adopt two international conventions on early notification of a nuclear accident and emergency assistance and response, and endorse an expanded nuclear safety programme.
- An Emergency Response System is set up at the Agency in support of the conventions. Issues of nuclear plant safety, radiological protection, waste management, health, and environment begin to dominate global, and IAEA, agendas, and nuclear power's future is reassessed in many countries.

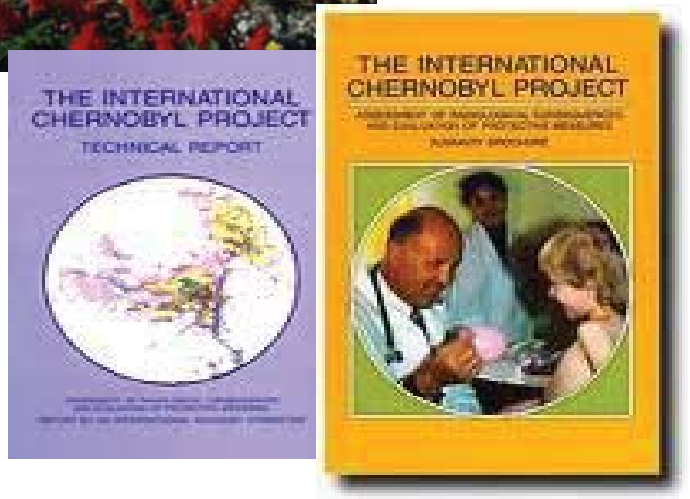
THE EIGHTIES &THE CHANGING AGENDA

1987- 1989

- **Sterile insect techniques is developed and successfully applied in Libya, Mexico, Chile , Guatemala, Zanzibar and other countries.**

- **IAEA submits a report on the role of nuclear power to "sustainable development to the UN.**

- **The Chernobyl post accident review conference makes the first in depth assessment of the accident.**



THE NINETIES &THE NEW REALITIES

- **INES** scale launched
- **China, France announce intention to sign the NPT**; Argentina and Brazil move to set up common system of verification for the peaceful use of nuclear energy, including acceptance of comprehensive IAEA safeguards
- UN Security Resolution 687, demands **dismantling Iraq's nuclear, chemical and biological weapons capabilities**. The IAEA sets up Iraq Action Team to carry out its responsibilities under the Security Council resolution and nuclear inspections begin in May 1991.
- IAEA project on the **safety of older Soviet designed nuclear plants** in Bulgaria, Czech Republic, Slovakia and Russia is launched.
- **Chernobyl project** reports the consequences of the accident.
- The **Democratic People's Republic of Korea (DPRK)** signs NPT-safeguards agreement with the IAEA.
- **DECADES** project is launched.

THE NINETIES &THE NEW REALITIES

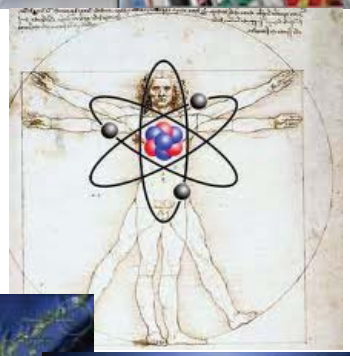
- Non-compliance of DPRK.
- South Africa gives up nuclear weapons program.
- States adopt Convention of Nuclear Safety.
- NPT is indefinitely extended.
- Comprehensive Test Ban Treaty is established.
- Mohamed ElBaradei becomes DG of IAEA.
- Iraq inspection activities provide a clear picture of the nuclear activities.
- WIPP is opened in the US.
- We conduct the first Scientific Forum.
- Y2K

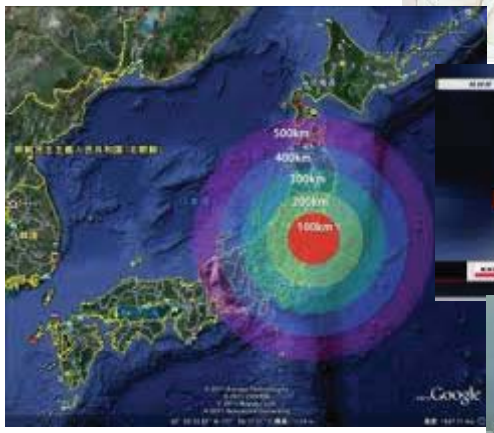
The 21st Century

- NE Establishes **INPRO** project with support from Russia, China, India and others.
- The **Nuclear Knowledge Management** program is also established.
- **DPRK, IRAQ and IRAN** – an "extraordinary bargain".
- The **ITER** project lifts off.
- IAEA and ElBaradei receive the **NOBEL price!**

The 21st Century

- IAEA marks its 50th anniversary.
- A Scientific Forum looks into the next 50 years.
- The Nuclear Renaissance lifts off.
- F U K U S H I M A





The IAEA is the single UN organization providing global assurance for safety security and non-proliferation.