IAEA

International Atomic Energy Agency

Improving Global Emergency Preparedness for Nuclear Crisis Situation

History of the International Atomic Energy Agency (IAEA)

Introduction In 1952, United States President Eisenhower envisioned an organization that would support the peaceful use of nuclear technology in his famous “Atoms for Peace” speech. With the use of nuclear weapons in the attacks on Hiroshima and Nagasaki at the end of the Second World War, the threat of nuclear technology had become very real. At the same time, the chances for the peaceful use of nuclear technology could not be denied either. Thus, in order to solve this “nuclear dilemma” an international organization should be established. Four years later President Eisenhower’s vision became reality when negotiations to create an International Atomic Energy Agency(IAEA) were held. On October 23, 1956, 81 states met at the United Nations Headquarters in New York and adopted the Statute of the IAEA. On July 29, 1957, the IAEA was officially founded after the required number of 26 States had deposited their documents of ratification. The Statute lays down the primary goal of the Agency as “to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world.” Although Member States had agreed that atomic energy was only to be used peacefully, cooperation in light of the arms race between the United States and the Soviet Union was rather difficult. Tensions reached a high point in the Cuban Missile Crisis caused by the Soviet Union, which installed intermediate-range missiles in Cuba in reach of the American mainland. The confrontation showed the greater need for legal measures to control the spread of nuclear technology. After this high point of confrontation, the easing of relations between the United States and the Soviet Union began, and new opportunities for the IAEA evolved. One of the most important issues for states wasto effectively prevent the further proliferation of nuclear weapons.

Structure of the IAEA

The IAEA currently has 154 Member States, which are all represented in the General Conference (GC) where they each have one vote. The GC is the highest decision-making body of the IAEA and meets once a year in September to decide on the budget of the agency, approve the annual report submitted by the Board of Governors, and give recommendations to the Board. The Board of Governors, to which 35 members of the IAEA are elected, is the main executive organ of the IAEA. Its Members are either elected for a one-year term by the 15 outgoing Members of the Board, or for a two-year term by the General Conference according to a system that ensures the equitable distribution of regions. The Board generally consists of experts and meets five times a year, with two ofthe meetings held immediately before and after the meeting of the GC in September.

Mandate and Activities

The work of the IAEA is subdivided into three pillars:

- Promoting science and technology,
- Developing nuclear safety standards to maintain high levels of safety standards to protect human health and the environment against radiation, and
- The safeguards and verification system under the Nuclear Non-proliferation Treaty (NPT).

Under the first pillar falls the Agency's engagement in the health sector, such as providing knowledge of nuclear medicine for early diagnosis of chronic and non-communicable diseases in developing countries. Another example is its cooperation with the Food and Agricultural Organization (FAO) to use nuclear techniques in the conservation of soil and water resources. Relationship with the UN From the beginning, the IAEA has stressed its mission to be under the umbrella of the UN and in line with the principles of the Charter of the UN. Still, the IAEA is somewhat unique within the UN system as it is the only agency focusing on issues specifically related to nuclear technology. The General Conference's annual reports are submitted to the UN General Assembly Plenary and, if related to issues of international security, to the Security Council. The IAEA's work is closely linked to the Security Council (SC), which can request the Agency to take actions on issues concerning peace and security. SC Resolutions regarding safeguards and the proliferation of nuclear weapons such as SC Resolutions 1373 and 1540 are examples of this cooperation and have become integral parts of the Agency's legal framework. Both Resolutions call for close cooperation with the IAEA to counter nuclear terrorism and the possession of nuclear material by non-state actors. The IAEA has established programs to support Member States in taking effective measures of that concern. Treaty on the Non-Proliferation of Nuclear Weapons In 1968, UN Member States signed the Non-Proliferation Treaty (NPT), which declared that only a state "which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967" shall be considered a legal nuclear weapon state. The Treaty commits all other states to refrain from acquiring nuclear weapons and requests states holding nuclear technology to contribute to its peaceful use by providing material, knowledge, and assistance. The NPT, which entered into force in 1970, is often referred to as a system of the three pillars: non-proliferation, disarmament, and the right to peacefully use nuclear technology. While the NPT was not negotiated within the IAEA, it assigned the IAEA to the surveillance of its treaty provisions and for the first time endorsed the effective establishment of safeguards under the responsibility of the Agency. Safeguards are agreements between an IAEA Member State and the Agency, which grant IAEA inspectors access to the state's nuclear program; Safeguards include inspections of locations, facilities, and reviewing materials are only used as declared by Member States. Thus, the IAEA and the NPT are closely connected and the mandate of the NPT has become a focus of the Agency's work.

Past and Present Challenges

Safeguard Agreements Though the NPT had called for more effective safeguards, it was the discovery of a hidden nuclear weapons program of Iraq during the Gulf War in 1991 that fueled discussions about strengthening safeguards. Only the SC's request for more intrusive inspections of the Iraqi nuclear facilities revealed its nuclear aspirations, which went beyond the declared program under safeguards. Discussions were again deepened in 1992 when inspections discovered the Democratic People's Republic of Korea (DPRK) was having more plutonium than declared. Both experiences made clear that additional protocols to agreements must be developed to grant inspectors expanded access to undeclared locations and facilities. However, the DPRK withdrew its membership to the IAEA in 1994, followed by the withdrawal from the NPT in 2003. A state wishing to withdraw from the Treaty notifies all partiesto the Treaty and the SC three months in advance giving a statement of the events that led to the country's withdrawal. This easy process raises concerns countries might withdraw from the NPT once they gained enough stocks of weapon-usable material. Today, the Iranian nuclear program and the nuclear aspirations of Syria are further issues

of concern. Despite its membership to the NPT, Iran remains reluctant to fully disclose its nuclear program and does not grant access to all its facilities. The latest meeting held on that matter in June 2012 ended without results. Although the facility suspected to be part of a Syrian nuclear weapon program was destroyed in 2007, the IAEA still wants to clarify whether or not this facility was a nuclear reactor. As of 2012, there are currently 178 states with more than 1100 facilities under safeguards. The Agency estimates an additional 300 reactors within the next 20 years will be installed, which will pose further challenges on the safety and protection of people. The Agency is thus eager to increase accession to safeguards and additional protocols.

Safety and Security

The nuclear catastrophe at TEPCO's Fukushima Daiichi nuclear power plant in March 2011 showed the need for improving mechanisms related to the second pillar and the safety of humans and the environment against radiation. The Fukushima catastrophe has been a throwback for the trust in nuclear energy as it hit the nuclear "role model" Japan. In September 2011, the Board of Governors adopted The IAEA Action Plan on Nuclear Safety, which was agreed upon by a Ministerial Conference earlier that year "in order to strengthen nuclear safety, emergency preparedness and radiation protection of people and the environment worldwide." A special focus lies within capacity building for quick responses to nuclear incidents and to find the best-suited measures for the individual state instead of general solutions. The IAEA Medium Term Strategy The IAEA today is a "unique multidisciplinary organization in the United Nations system. " The diversity of its mandate is documented in the Agency's Medium Term Strategy (MTS) 2012- 2017, which is part of the Long-Term Strategy 2012-2023 (LTS). The LTS was released by the Department of Safeguards in 2010 after a two-year planning process. According to the MTS the Agency's primary future challenges are: global energy security, human health, food security and safety, water resource management, and nuclear safety and security and nonproliferation. Trough the Medium Term Strategy the IAEA contributes to achieve the Millennium 6 Development Goals by providing management, guidance, and support for the effective implementation of peaceful nuclear programs. The IAEA has come a long way from its foundations until today. The spread of nuclear technology will increase, which leaves nuclear safety a high importance for the Agency. The story of IAEA safeguards is a story of success, still one with many challenges lying ahead. The ratification of additional protocols and amendments to ensure the peaceful use of nuclear technology in the 21st century is an important part of this goal. The Agency must thus continue to spread knowledge of and cooperation among countries for the peaceful use of nuclear technology as well as efforts to strengthen safeguard agreements.

Past Nuclear Crises that Have Impacted the Nuclear Security Debate

Nuclear power station accidents and incidents

Year	Incident	INES level	Country	IAEA description
2011	Fukushima	5	Japan	Reactor shutdown after the 2011 Sendai earthquake and tsunami;

Nuclear power station accidents and incidents

Year	Incident	INES level	Country	IAEA description
				failure of emergency cooling caused an explosion
2011	Onagawa		Japan	Reactor shutdown after the 2011 Sendai earthquake and tsunami caused a fire
2006	Fleurus	4	Belgium	Severe health effects for a worker at a commercial irradiation facility as a result of high doses of radiation
2006	Forsmark	2	Sweden	Degraded safety functions for common cause failure in the emergency power supply system at nuclear power plant
2006	Erwin		US	Thirty-five litres of a highly enriched uranium solution leaked during transfer
2005	Sellafield	3	UK	Release of large quantity of radioactive material, contained within the installation
2005	Atucha	2	Argentina	Overexposure of a worker at a power reactor exceeding the annual limit
2005	Braidwood		US	Nuclear material leak
2003	Paks	3	Hungary	Partially spent fuel rods undergoing cleaning in a tank of heavy water ruptured and spilled fuel pellets
1999	Tokaimura	4	Japan	Fatal overexposures of workers following a criticality event at a nuclear facility
1999	Yanangio	3	Peru	Incident with radiography source resulting in severe radiation burns
1999	Ikitelli	3	Turkey	Loss of a highly radioactive Co-60 source

Nuclear power station accidents and incidents

Year	Incident	INES level	Country	IAEA description
1999	Ishikawa	2	Japan	Control rod malfunction
1993	Tomsk	4	Russia	Pressure buildup led to an explosive mechanical failure
1993	Cadarache	2	France	Spread of contamination to an area not expected by design
1989	Vandellos	3	Spain	Near accident caused by fire resulting in loss of safety systems at the nuclear power station
1989	Greifswald		Germany	Excessive heating which damaged ten fuel rods
1986	Chernobyl	7	Ukraine (USSR)	Widespread health and environmental effects. External release of a significant fraction of reactor core inventory
1986	Hamm-Uentrop		Germany	Spherical fuel pebble became lodged in the pipe used to deliver fuel elements to the reactor
1981	Tsuraga	2	Japan	More than 100 workers were exposed to doses of up to 155 millirem per day radiation
1980	Saint Laurent des Eaux	4	France	Melting of one channel of fuel in the reactor with no release outside the site
1979	Three Mile Island	5	US	Severe damage to the reactor core
1977	Jaslovské Bohunice	4	Czechoslovakia	Damaged fuel integrity, extensive corrosion damage of fuel cladding and release of radioactivity
1969	Lucens		Switzerland	Total loss of coolant led to a power excursion and explosion of experimental reactor
1967	Chapelcross		UK	Graphite debris partially blocked a fuel channel causing a fuel element to melt and catch fire

Nuclear power station accidents and incidents

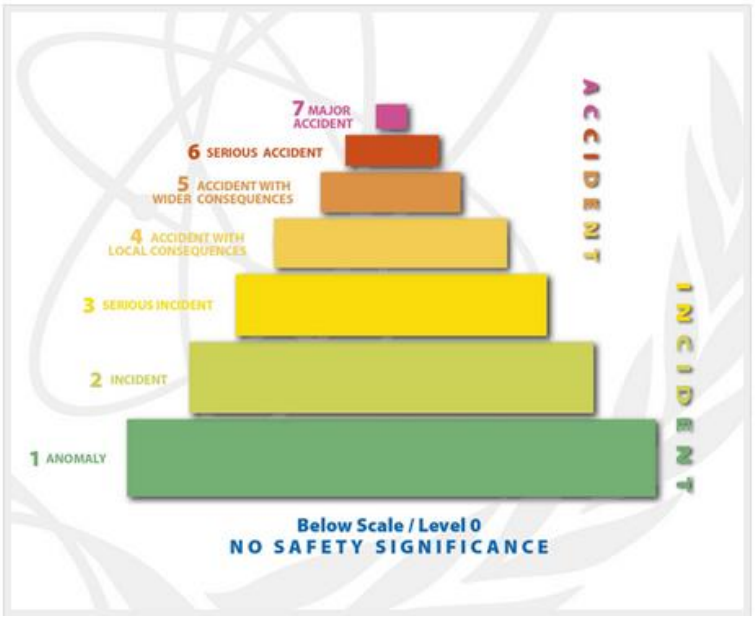
Year	Incident	INES level	Country	IAEA description
1966	Monroe		US	Sodium cooling system malfunction
1964	Charlestown		US	Error by a worker at a United Nuclear Corporation fuel facility led to an accidental criticality
1959	Santa Susana Field Laboratory		US	Partial core meltdown
1958	Chalk River		Canada	Due to inadequate cooling a damaged uranium fuel rod caught fire and was torn in two
1958	Vinča		Yugoslavia	During a subcritical counting experiment a power buildup went undetected - six scientists received high doses
1957	Kyshtym	6	Russia	Significant release of radioactive material to the environment from explosion of a high activity waste tank.
1957	Windscale Pile	5	UK	Release of radioactive material to the environment following a fire in a reactor core
1952	Chalk River	5	Canada	A reactor shutoff rod failure, combined with several operator errors, led to a major power excursion of more than double the reactor's rated output at AECL's NRX reactor

INES Scale

INES is a tool for promptly and consistently communicating to the public the safety significance of events associated with sources of ionizing radiation.

INES

The International Nuclear and Radiological Event Scale



Understanding Nuclear Crisis

Interpreting the "nuclear crisis" is a phenomenon in which a variety of military, political, and cultural transformations converged, and has three distinct but interrelated angles:

1) Cultural Representations of the Nuclear Threat

It looks at manifestations of the nuclear threat in popular culture (music, film, novels) as well as in "high art," embedding them in larger transformational processes in the media landscape and new forms of political communication (e.g., the "pop"-ularization of politics).

2) Changes in the Sociopolitical and Economic Spheres

It investigates the nuclear crisis as an interrelated discourse that is both an expression and catalyst of structural transformations of the sociopolitical and economic sectors during the 1970/80s, such as shifting value systems (e.g., postmodernism, -industrialization, -materialism) and the transition from Keynesian global control to the liberalization of society and to economic and social policies that were critical of the role of government.

3) Transatlantic and Global Transformations

It examines the diplomatic, political, and strategic debates surrounding nuclear power and nuclear armaments. "Traditional" actors such as the political, diplomatic, and military elites carried these debates forward as did "anti-establishment" forces and non-state actors on both sides of the Iron Curtain.

Problems with Nuclear Power

The government wants to build new nuclear power stations. If their plan succeeds, it will be at the cost of blocking the real solutions to climate change and a reliable future energy supply. It will also result in the continued production of dangerous nuclear waste and an increased risk from terrorism, radioactive accident and nuclear proliferation.

Climate change

New nuclear power stations would not stop climate change. Even at the most optimistic build rate - 10 new reactors by 2024 – our carbon emissions would only be cut by four per cent: far too little, far too late. Given the nuclear industry's poor track record it's highly unlikely that ten reactors could be built within two decades. The most contemporary example of building a new reactor is in Finland; just one year into construction, the completion date has been delayed by 18 months and its costs have spiralled by up to 2 billion Euros over budget.

Worse still, new investment in nuclear power and its infrastructure will block development of renewable energy and energy efficiency – the real solutions to climate change.

Energy security

Nor would new nuclear power stations address the anticipated gap in our future energy supply. This is because nuclear power only produces electricity and so only marginally deals with our need for services like hot water and central heating which are mainly met by gas. Its overall contribution to total energy demand is too small to make a difference to the UK's energy security.

Radioactive waste

The UK now has enough radioactive waste to fill the Royal Albert Hall five times over. There's still no safe way to deal with it. The government plans to bury it deep underground - out of sight, out of mind, for now at least. But no one can guarantee that this highly radioactive waste won't leak back into the environment, contaminating water supplies and the food chain.

Allowing ten new reactors to be built would add threefold to the amount of highly radioactive waste we already have to deal with. This waste will remain dangerous for up to a million years: an outrageous legacy to leave for many generations to come.

Terrorism

Aside from the risk of a terrorist strike directly onto a nuclear power station, the nuclear industry transports thousands of tonnes of radioactive waste around the UK by road, rail and sea. Every week, communities up and down the country are put at risk from potential radioactive contamination as these trains trundle through our cities, towns and villages. There are no police or security personnel on board and there are no local plans in place to deal with an emergency. If a nuclear waste train was involved in a terrorist attack, tens of thousands of people could be exposed to cancer causing radiation and whole regions might have to be evacuated.

Safety

Over twenty years since the world's worst nuclear disaster, Chernobyl, the human and environmental consequences are still being suffered internationally. Nuclear power is inherently dangerous and, despite claims of improvements in safety, scientists agree that another catastrophe on the scale of Chernobyl could still happen any time, anywhere.

Ironically, climate change itself also threatens the safety of nuclear power stations; many reactors are built on coastal sites vulnerable to the impacts of sea level rise, including flooding and erosion.

Reprocessing and nuclear proliferation

Nuclear waste is taken from wherever it is produced, across the country, to Sellafield in Cumbria for reprocessing. During reprocessing, plutonium is separated from other wastes for supposed re-use in nuclear reactors. In reality none of this plutonium is reused for electricity generation. The UK now has a stockpile of over a hundred tonnes of deadly plutonium - and no plans for what to do with it.

One of the fundamental problems of nuclear power is the hazard posed by the radioactive materials it produces – some of which can be used in nuclear weapons and all of which can be used in so-called dirty bombs. Just one particle of plutonium can be fatal.

Cost

The nuclear industry is hugely expensive. The construction and generating costs of nuclear power are greater than most renewable energy and energy efficiency technologies. Added to these are costs associated with dismantling nuclear stations and waste disposal. The clean up costs for the UK's existing nuclear industry and its waste have alone been estimated at up to £100bn. That's £100bn of public money.

POTENTIAL FUTURE NUCLEAR CRISIS SITUATIONS

Potential future nuclear crises are examples of crises that have not occurred yet, but that the IAEA is attempting to prevent. Examples of potential nuclear disasters include nuclear terrorism (such as dirty bombs) and the potential harms that could occur if the safety of spent fuel during transport and storage is compromised.

Currently, one of the biggest fears faced by many Member States is the idea of a terrorist organization having a nuclear weapon in their possession, and there is a consensus that this is a real threat. At least four recognized terrorist organizations have expressed their desire to obtain a nuclear weapon, specifically a dirty bomb. According to former United Nations Secretary-General Kofi Annan, "an act of nuclear terrorism 'would thrust tens of millions of people into dire poverty' and create 'a second death toll throughout the developing world.'" In 2010, US President Barack Obama held a summit in Washington D.C. in regards to the safeguard of nuclear materials. This put nuclear security high on the agenda of multiple world leaders, and the topic was again discussed during the March 2012 Nuclear Security Summit in Seoul, South Korea. The Seoul Communiqué, published on the final day by the IAEA, "noted the essential role of the IAEA in facilitating international cooperation and supporting the efforts of countries to fulfill their nuclear security responsibilities." Given the duties of the IAEA, an interesting facet of the nuclear security debate is a discussion regarding the Fukushima Daiichi Nuclear Disaster. According to facts coming out of the Seoul Summit, had Japan implemented some of the recommendations made to them by the US regarding anti-terrorist measures, Japan could have mitigated the damage caused to the Fukushima Daiichi Nuclear Power Plant. Documents published since the Fukushima Disaster put forward that this type of disaster was not unforeseeable and the possibility that this could occur was simply ignored by the Japanese government. The reason that Japan had not instituted anti-terrorist measures at any of its nuclear power plants is because the Japanese government believed that a September 11th style attack on its nuclear power plants would be inconceivable. According to an article published by the Associated Press, "as leaders from around the world head to Seoul for a major summit this week on nuclear security, Japan's disaster at its Fukushima plant has provided a salient example of how solid protections against terrorist attacks go hand in hand with protections

against natural disasters." As evidenced by these meetings, nuclear security is important to prevent nuclear terrorism, but is also vitally important in order to safeguard the transport of spent fuel and radioactive waste.

2) The Transportation and Safety of Spent Fuel and Radioactive Waste: One of the major duties of the IAEA is to help maintain the safety of spent fuel and radioactive waste during transportation and storage. The Goiâna incident is a salient example of what could occur if nuclear fuel is not protected. Although nuclear power plants produce much less radioactive waste than the waste issued by a traditional coal power plant, the storage of the byproduct is much more difficult. One solution to this problem that the IAEA proposes is a global safety regime regarding radioactive waste and spent fuel. Yet, what is alarming about this issue is that although many Member States have developed temporary solutions to store radioactive waste, only three Member States (France, Finland, and Sweden) are currently 15 leading the cause to find a deep, geological solution to store the radioactive waste. Finland has developed the most positive results to date, as their deep, geological plan is both supported by the public and the is in the preliminary stages of obtaining a construction license to create such a facility. The IAEA has, however, developed a protocol for waste management and spent fuel, and assists Member States in the application of these safety standards. Additionally, the IAEA has continued to update these safety standards every year to better suit the desire to meet necessary safety precautions.

Questions to Answer

1. What all events come under nuclear crisis situations?
2. How to address nuclear crises when they happen, how to do so effectively, and how to go about doing so in the safest manner possible.
3. Given the countless number of conventions, protocols, and safety standards, is there a way to streamline this process? Should each nuclear power plant be required to give reports directly to the IAEA? S
4. Should the IAEA be responsible for monitoring safety protocols and ensure that all nuclear power plants are in compliance?
5. How should the IAEA encourage Member States to sign onto existing conventions and participate in meetings such as the May 2012 Fourth Review of the Joint Convention? How can more Member States be encouraged to seek deep, geological solutions to dispose of their radioactive waste?