Research Report

General Assembly 4

Discussing measures against atomic radiation

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INTRODUCTION

Atomic radiation poses a threat, which challenges the international community by demanding unified efforts to safeguard our shared future. The General Assembly's Fourth Committee focuses on addressing these serious issues, the urgency of establishing measures against atomic radiation cannot be overstated.

Ionising radiation is a paraphrase for atomic radiation, it refers to the release of electromagnetic waves or particles from an unstable atom. Atomic radiation is commonly associated with the process of decaying radioactive materials. There are three main forms of atomic radiation, Alpha Radiation, Beta Radiation and Gamma Radiation, preventing all forms of radiation is key. However the measures that can be used for protection against atomic radiation differ. Some measures include protective clothing, respiratory protection, shielding materials, maintaining distance, thick shields, personal protection, and shielding work environment.

The issues created by atomic radiation are not temporary, the effects are timeless and they do not take borders into account affecting other nations. Atomic radiation affects communities, whole ecosystems and international relations. It can create everlasting effects, for example the dilapidated areas that became uninhabitable due to the atomic pollution and the dangers that radioactive contamination beholds. It will also impact wildlife potentially causing extinction or endangerment, and potentially changing the genetic changes to populations due to the effect of radiation on DNA. These effects transcend borders—from the aftershocks of Chernobyl, changing the genetic code of the children of the victims of the disaster, and the skyrocketed increase of thyroid cancer. To the everlasting effects of Fukushima, contaminating fruits and vegetable crops through soil and water pollution. Imported goods from Japan still undergo radiation checks, if the goods exceed the limit they were returned to the sender affecting the Japanese trade and economy.

A great danger of atomic radiation is the effect that it has on organisms and its environmental effects. It causes cellular damage, which can result in lymphoma and a higher risk of developing lymphoma or hereditary issues. Radiation sickness is another common issue that atomic radiation creates, which causes nausea, vomiting and it damages vital organs. Biodiversity will decline when there is radioactive contamination , and the incidents can also lead to soil and water pollution which could affect the whole ecosystem.

The impact that atomic radiation has on the global spectrum is enormous, therefore atomic radiation is a global issue. Establishing measures against it is of utmost importance, measures for prevention is key, however measures for safety, reduction and protection should not be disregarded. The General Assembly's Fourth Committee is responsible for finding measures that help safeguard our future, health and safety concerning atomic radiation.

Definitions of Key Terms

Radioactive contamination

This term is a paraphrase for radioactive pollution, when radioactive materials are released into the environment resulting from an accident, natural event, or an act of terrorism. This release can contaminate their surroundings.

Lymphoma

It is a collective term for cancer that forms in the cells of the lymph system. There are two main types of lymphoma, the difference is the prognosis. Hodgkin lymphoma can often be cured, but the prognosis of non-hodgkin lymphoma depends on the specific type and severity.

Thyroid cancer

A disease in which cancerous cells form in the tissues of the thyroid glands. Gender, age and exposure to radiation can affect the risk of thyroid cancer.

Leukaemia

It is a collective term for cancers of the white blood cells, leukaemia forms in the bone marrow. There are two groups of leukaemia, based on the type of white blood cells that are affected–lymphoid or myeloid; and how rapidly the disease develops and worsens.

Acute radiation syndrome

Also known as ARS, acute radiation syndrome is a severe illness caused by great exposure to atomic radiation (usually minutes). There are 4 stages of ARS, the prodromal phase, the incubation phase, the onset phase, and the convalescent phase or death in the worst case.

Ionising radiation

It is energy that originates from a source and travels through space or material. This RR (Research Report) will discuss ionising radiation, this is a collective term for all variants of radiation in which it has enough energy to remove an electron from an atom, which makes it an ion. To stabilise themselves, the atoms give off or emit the spare energy or mass in the form of radiation.

Alpha Radiation

It is recognized by its positive charge, and its particle nature that consists of alpha particles. The penetration power is relatively low, which can be stopped by a sheet of paper or a distance of a few centimetres. It is commonly used for the treatment of cancer, in smoke detectors, and to provide power in spacecraft.

Beta Radiation

It has two types of charges, beta-minus particles have a negative charge and beta-plus particles have a positive charge. It involves the emission of beta particles, which can be electrons (beta-minus decay) or positrons (beta-plus decay). Beta Radiation has greater penetration power than Alpha Radiation, it can be stopped by a few millimetres of plastic, glass or aluminium. It is used for material thickness monitoring, and in tracers.

Gamma Radiation

It is recognized by its neutral charge, Gamma Radiation consists of electromagnetic waves similar to X-rays but with greater energy. This type of radiation is highly penetrating, this requires strong dense materials such as lead or several centimetres of lead to effectively shield against it. As mentioned above, gamma rays are used for radiotherapy, but they are also used for sterilisation and disinfection and the nuclear industry.

Atomic nuclei

It consists of electrically neutral neutrons and electrically positive protons. When the atoms of an element have extra protons or neutrons, it will create extra energy in the nucleus in the atom. The extra energy causes the atom to become unstable, the unstable atomic nuclei of radioactive atoms will then emit radiation.

The General Assembly's Fourth Committee (GA4)

The Special Political and Decolonization Committee is responsible for a variety of issues. Like the name suggests, decolonization, but also assistance to Palestine refugees, peacekeeping operations, and the effects of atomic radiation.

General overview

Atomic radiation is a complex issue, created by the release of energy in various forms during the decay of unstable atomic nuclei. This is known as radioactive decay, it can create three main types of radiation. Atomic radiation can be very useful, it is utilised in different industries. It is used in medicine, named nuclear medicine procedures, they can diagnose and treat certain illnesses. Nuclear techniques are utilised in the industry to identify and assess properties of differ materials, measure pollution levels, and are able to sterilise and disinfect components. Lastly, nuclear reactors are used for producing energy, the fuel triggers a chain reaction that produces heat, radiation and radioactive waste products. The energy production does not produce any carbon dioxide, so it is somewhat better for the environment. However atomic radiation additionally poses significant risks that impact both the environment and living organisms.

The primary concern with atomic radiation lies in its potential to cause harm, due to the effects that radiation has on living cells. It leads to molecular and cellular damage, this damage can have a wide range of consequences. From acute health effects like nausea and vomiting, skin redness, hair loss, acute radiation syndrome, local radiation injuries (radiation burns), or even death. The long-term impacts on human health like a higher risk for leukaemia, lymphoma, and it might increase the risk of cardiovascular disease and some other non-cancer diseases. Furthermore radiation increases the risk of mutations in doubling cells, this mutation will eventually pass down to the next generation. It also affects the ecosystem by causing death and disease due to the high levels of radiation and it could lead to extinction of local endangered plants and animals.

The impact of atomic radiation on various parties is phenomenal, from workers in nuclear industries to multiple countries. Individuals working in nuclear power plants, research facilities, and other nuclear industries are at risk of exposure to atomic radiation. The populations near those nuclear facilities are also at a higher risk to exposure, especially in the event of accidents or incidents. Another unexpected group are medical patients who undergo certain medical procedures, such as X-rays or radiation therapy; these patients are exposed to controlled doses of radiation. An incident or accident does affect surrounding wildlife and the ecosystem, radiation causes ecological disruptions, such as water and/or soil pollution, which can also impact agriculture. In addition the impact radiation has on living cells also includes all animals, which means that there can occur genetic changes in affected species, potentially causing extinction.

There are various means in which countries can be impacted by, including nuclear accidents, weapons testing, and the use of nuclear technology. The Chernobyl Disaster in 1986 greatly impacted Ukraine, then part of the Soviet Union. Ukraine experienced one of the greatest nuclear disasters in history at the Chernobyl Nuclear Power Plant, the fallout impacted

Ukraine but also neighbouring countries like Russia and Belarus. As the successor state to the Soviet Union, Russia faced consequences from the Chernobyl disaster, which included the health impacts on its population and contamination of its territory. Western and European countries including Sweden and Norway also suffered from the fallout from the Chernobyl disaster, which led to contamination of agricultural products and health effects on their populations. In 2011 a severe earthquake and tsunami occurred at the Fukushima Daiichi Nuclear Power Plant, with concerns about radioactive releases affecting the Pacific region, the incident impacted Japan's economy. The radioactive releases polluted the soil and water, contaminating the vegetable crops and fruits, imported goods originating from Japan still undergo checks for contamination. The USA conducted numerous nuclear weapon tests in the mid-20th century, both underground and atmospheric. The fallout impacted areas such as the Marshall Islands and parts of the contidential US. The Marshall Islands are part of the Pacific Island Nations which were directly affected by nuclear weapon testing conducted by a variety of countries, including the USA and the former Soviet Union. India and Pakistan both have conducted nuclear tests in the late 20th century, which raised concerns about the environmental and health impacts in the region. Another country that is known for its nuclear tests is the DPRK, their tests have raised concerns about the impact of atomic radiation and their activity is closely monitored. During the Gulf War in 1991, there were concerns about long-term environmental and health impacts because of the use of depleted uranium (DU) in military munitions.

While there is an enormous amount of beneficial applications of atomic radiation, managing its risks, particularly in energy, industrial and medical sectors, is essential to ensure safety of individuals and the environment. Ongoing research, safety protocols, and strict regulations contribute to the responsible handling and mitigation of potential hazards associated with atomic radiation.

Major parties involved

International Atomic Energy Agency (IAEA)

The IAEA is an independent international organisation under the United Nation, it promotes secure and peaceful use of nuclear energy. It provides technical assistance, establishes safety standards and conducts inspections.

United States of America (USA)

The USA is a major party that is involved in this issue due to the advancements in nuclear technology. The USA has a significant presence in activities related to atomic radiation, such as nuclear power generation, research facilities, and a history of nuclear weapon testing.

The Russian Federation (Russia)

Russia has been actively involved in nuclear energy, research, and military applications. The Chernobyl disaster in Ukraine, formerly part of the Soviet Union, had effects on Russia.

People’s Republic of China (China)

The nuclear capabilities of China are rapidly expanding its nuclear capabilities, with a focus on civilian nuclear power and military applications. China is investing in nuclear research, has conducted nuclear tests, and has developed nuclear reactors.

Japan

The Fukushima disaster in 2011 led Japan to the global spotlight regarding atomic radiation. Japan is still suffering from the aftermath of the incident, influencing safety measures and its nuclear policies.

India

India is known for its expanding nuclear program for both civilian energy purposes and military applications. India has conducted nuclear tests and is continuously developing its nuclear abilities.

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

The UNSCEAR reports on the levels and effects of atomic radiation. It provides scientific information to the United Nations and member states.

Timeline of Key Events

1946-1958 Marshall Islands

The Marshall Islands are located between Hawaii and Australia, in 1914 Japan captured the Marshall Islands to build military bases. After USA marine and army forces defeated the Japanese troops, they turned the bases into USA military bases. The bases were reformed to nuclear test sites, between 1946 and 1958, The USA conducted 67 nuclear tests on Marshall Islands, they conducted their largest nuclear test called the Castle Bravo Test on one of the Islands called Bikini Atoll on March 1, 1954. During the nuclear testing the Marshallese were not aware of the dangers of the tests, they experienced radiation sickness, burns and birth defects due to the radiation. In 1970 the USA began cleaning the islands to make them inhabitable again.

1949-1989 Semipalatinsk, Kazakhstan

The Semipalatinsk was one of the primary test sites for the Soviet, it was used for above and underground testing. It consisted of 4 major testing areas, along with 2 research reactors. 116 atmospheric nuclear weapons tests took place, either detonated on towers or dropped from aircraft. After the Limited Test Ban Treaty, the Soviet Union carried on with underground nuclear tests, 340 underground nuclear tests took place. The test range was officially closed in 1991, additionally table salt was produced from a lake near the main test field. The IAEA recommended that a comprehensive assessment of the test site should be conducted.

1951-1992 Nevada Test Site, USA

The Nevada Test Site was established in December, it was created to become the nation's on-continent nuclear weapon test site. They conducted tests on how atomic weapons affect animals and various types of buildings. The Nevada Test site is responsible for the spread of a massive amount of radioactive particles globally. A study in 1999 estimated that the nuclear tests increased the thyroid cancer expectancy from 10,000 to 75,000 cases. Currently it has contaminated a huge amount of soil and water, the test site is now used as an educational tool with tours around the Nevada Test Site.

1960 Paris Convention on Third Party Liability in the Field of Nuclear Energy

The convention implemented an international regime to deal with the problems in the field of nuclear energy. It provides compensation to the public for damage that results from a nuclear accident, and it ensures growth of the nuclear industry would not be hindered by bearing a burden of liability.

1963 Vienna Convention on Civil Liability for Nuclear Damage

The aim of the convention was to establish minimum standards for providing financial protection against damage that results from peaceful use of nuclear energy for Contracting Parties. The conference made sure that they have clear laws and regulations for civil liability.

1986 Chernobyl, Ukraine

The accident resulted from a Soviet designed reactor that had serious mistakes and personnel that were not qualified. The reactor exploded and released some of the radioactive core in the environment. The workers died during the night after the explosion and 28 people died from acute radiation syndrome in a few weeks, 350,000 people were evacuated.

1986 Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

This convention followed after the Chernobyl accident, it created a framework for cooperation among States Parties and with the IAEA to provide assistance to nuclear accidents or radiological emergencies. States were now required to notify the IAEA about their experts, equipment, and materials for providing assistance.

1994 Convention on Nuclear Safety

This convention aimed at Contracting Parties operating land-based civil nuclear power plants to maintain a high level of safety, they established safety principles. The conference was created by parties who shared the common interest in higher levels of safety, promoted and developed through regular meetings.

2011 Fukushima, Japan

A major earthquake, followed by a tsunami disabled the power supply of three reactors. The cooling system was connected to the disabled power supply, causing rising temperatures in the reactor cores causing a nuclear accident. There have not been any deaths caused by the accident, or any cases of radiation sickness. However over 100,000 people were evacuated from their homes, due to the cautiousness of the government, the government has delayed the return of many.

Previous attempts to solve the issue

International Collaboration and Treaties (NTP)

The Treaty of the Non-Proliferation of Nuclear Weapons, created in 1968, aims to prevent the spread of nuclear weapons and promotes peaceful use of nuclear energy. Countries that are parties to the NTP commit to disarmament, non-proliferation, and the peaceful sharing of nuclear technology.

International Atomic Energy Agency (IAEA)

The IAEA, established in 1957, promotes the peaceful use of nuclear energy and the prevention of its use for any military purpose, including nuclear weapons. The agency

provides guidance, sets safety standards, and conducts inspections to ensure the compliance with the nuclear safeguards.

Chernobyl Forum (1986)

This forum was created as a response to the Chernobyl disaster, it was established to assess the consequences and recommend measures for mitigating the long-term impact on health and the environment. It involved various UN agencies, such as the IAEA, WHO, and UNDP.

Radiation Protection Guidelines (ICRP)

The International Commision on Radiological Protection has developed guidelines and recommendations for radiation protection to prevent or limit the harmful effects of ionising radiation. These guidelines are most often used in the development of national regulations.

Improvements in Nuclear Power Plant Design

Ongoing research focuses on developing advanced reactor technologies with enhanced safety features to minimise the risk of accidents and improve overall nuclear safety.

Renewable Energy Transition

The growing emphasis on renewable energy sources, such as solar and wind power, aims to reduce the dependence on nuclear energy and decrease the risk of atomic radiation incidents associated with nuclear power generation.

Nuclear Arms Reduction Treaties (START)

The various Strategic Arms Reduction Treaties between the USA and Russia have aimed to reduce the number of deployed strategic nuclear weapons, contributing to global efforts to prevent nuclear weapons proliferation.

Decontamination and Remediation

Following nuclear incidents, significant resources have been dedicated to decontamination and remediation efforts to reduce the environmental and health impacts of atomic radiation.

Possible solutions

Advanced Nuclear Reactor Technologies

Invest in the development of advanced reactor designs with enhanced safety features to minimise the risk of accidents and improve overall nuclear safety.

Renewable Energy Transition

Promote and invest in renewable energy sources like solar, wind, and hydroelectric power to reduce reliance on nuclear energy mitigating the risk of atomic radiation incidents associated with nuclear power generation.

International Collaboration

Foster international collaboration to share expertise, best practices, and research findings related to nuclear safety, emergency response, and radiation protection.

Improved Emergency Response

Enhance emergency response capabilities at local, national, and international levels to effectively manage and mitigate the consequences of nuclear incidents.

Public awareness and Education

Increase public awareness and education about the risks and benefits of nuclear technology, radiation safety, and emergency procedures to empower communities to respond effectively to potential incidents.

Radiation Monitoring and Surveillance

Implement comprehensive and continuous radiation monitoring programs around nuclear facilities, ensuring a real-time data collection to detect any abnormalities.

Innovative Decontamination Technologies

Invest in research and development of innovative technologies for innovative technologies for efficient decontamination and remediation of areas affected by atomic radiation incidents.

Education and Training for Nuclear Personnel

Ensure that the personnel working in nuclear facilities receive comprehensive education and training on safety protocols, emergency response procedures, and the responsible use of nuclear technology.

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