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International Atomic Energy Agency (IAEA)

Tackling the exponential increase in radioactive waste and the negative effects that come with it.

Committee Background

The IAEA established themselves in 1957, following Us President Dwight D. Eisenhower's "Atoms for Peace" speech to the United Nations General Assembly on December 8, 1953. In this address, Eisenhower proposed creating an international body to promote peace prevent the military from using nuclear energy. This initiative led to the drafting of the IAEA's statute, which was unanimously approved by 81 nations in October 1956 and came into action on July 29, 1957.

Over the decades the IAEA has played a crucial role in promoting the peaceful use of nuclear technology, they implement safeguards to prevent nuclear proliferation, they made safety standards to protect people and our environment. Notably, the agency and its director, Mohamed ElBaradei, was awarded three Nobel Peace Prize in 2005 for their efforts to prevent nuclear energy from being used for military purposed and to ensure a safe use.

Today, the IAEA continues to work with its Member States and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies. These contributes to peace and security and the UN's SDG's. In recent years, the IAEA has continues to play a role in global nuclear challenges. In 2024, the IAEA conducted over 3000 in-field verification activities at more than 1300 nuclear facilities worldwide, this will ensure compliance with international nuclear agreements.

The agency also facilitated discussions on nuclear safety and security, particularly in conflict zones, underscoring its commitment to preventing nuclear accidents. Additionally, the IAEA has been instrumental in promoting and peaceful use of nuclear technology in areas such as food security and water resource management.

The IAEA has 2 regional offices located in Toronto, Canada (since 1979) and Tokyo (since 1984), as well as 2 liaison offices in New York City (since 1957) and Geneva, Switzerland (since 1965). The agency runs laboratories specialised in nuclear technology in Vienna and Seibersdorf, Austria, it opened in 1961 in Monaco.

Topic Background

Radioactive waste is the product of nuclear power production, medical procedures, and scientific experiments, which are radioactive in nature. The history of radioactive waste is directly related to the evolution and application of nuclear energy and nuclear weapons. Its disposal and management have become an increasing concern for the world because of the long-term hazards it can cause to human health and the environment.

The story of nuclear waste begins in the middle of the 20th century, when the discovery of radioactivity was made by scientists. In 1896, the French physicist Henri Becquerel

uncovered that rays emitted by uranium salts could make photographic plates sensitive. Later, Marie and Pierre Curie discovered radium and polonium, pushing up the depth of knowledge within radioactive elements.

For the first time in history, larger experiments began to be implemented during the 1940s and 1950s. Atomic bombs were created during World War II, a moment when humans saw the first wide-scale application of radioactive materials. As the war ended and entered into an arms race situation, people started producing nuclear weapons. This led to the production of vast amounts of radioactive materials and waste, though much of it was hidden away in military sites and largely ignored in terms of public concern.

In the 1950s, the peaceful use of nuclear energy began to be promoted as a way to meet the world's growing energy needs. The United States, the Soviet Union, among others, initiated nuclear power plant construction for electricity production. Many nuclear power plants had systems unknown at that time for safely managing the produced byproducts because the reactors initially produced waste byproducts. By the time more and more nuclear power plants were built, radioactive waste was being generated; yet the disposal method was still just born.

By the 1970s, it was realised that nuclear waste was a huge problem. The United States, as well as other countries, set about how to get rid of it-by storing it deep underground or in special containers-but there were no established protocols, even poor technology and politics-which meant most countries still don't have adequate systems for safe disposal.

Concerns regarding the administration of radioactive waste grew exponentially, especially after catastrophic events like the 1979 Three Mile Island nuclear meltdown and the Chernobyl incident in 1986. Because of these notable disasters, awareness rose about the dangers and risks of utilising nuclear energy. As a result of this, international organisations like the IAEA began working alongside governments to improve safety and security measures, as well as enhance management of nuclear waste.

During the 21st century, concerns only increased after multiple countries started investing on nuclear power. New facilities were developed and older power plants began to operate again, making the need for safe disposal of radioactive waste crucial. Even though solutions have been proposed, there still exists much discussion about how viable and effective such solutions really are.

Efforts towards resolving this issue grew as the amount of disposed nuclear waste increased. The European Union (EU) created the European Radioactive Waste and Spent Fuel Management Forum in 1997 to focus on the safe and sustainable disposal of nuclear waste. Simultaneously, the U.S. commenced the Yucca Mountain Project in the state of Nevada, which would be an underground dumpster for radioactive waste. However, this project faced heavy criticism and backlash, leading to its cancellation.

Radioactive waste management is currently a central theme in the international discussion on nuclear power. Nations across the globe are still looking for safe and sustainable means of disposing of the waste generated by nuclear power plants, medical facilities, and other sources. The problem is still daunting because the waste is highly radioactive and takes thousands of years to lose its toxicity, requiring long periods of time.

Current Situation

Radioactive waste management involves the treatment and management of the waste that has been rendered radioactive and contaminated with radioactivity during the course of the nuclear cycle of fuel. The major reason behind it is the safeguarding of human life and the environment through the dilution and/or segregation of radionuclides to a non-harmful state. The waste produced through nuclear power generation happens to be smaller in comparison with the waste of other forms of generation of thermal power and the entire waste management cost is also fully borne by the industry. Furthermore, radioactive contents are not limited to the power generation sector; they also appear in the field of medicine, agriculture, scientific research and industry and each of them needs careful waste management techniques.

Radioactive waste varies based on radioactivity and the duration it will be radioactive. Low-level waste (LLW) includes such things as tools with small radioactivity that decays quickly and constitutes 90% of the waste and 1% of the radioactivity. Intermediate-level waste (ILW) includes higher radioactivity that also requires shielding during the manipulation and includes resins and chemical sludges and reactor parts and constitutes 7% of the volume and 4% of the radioactivity.

High-level waste (HLW) includes a great radioactivity that also has a lot of heat and includes spent nuclear fuel or waste that results during the reprocessing and constitutes 3% of the volume and 95% of the radioactivity. Management of each of the categories will require specialised management techniques that will aid in the maintenance of the environment and the safety.

Several of the major steps include the treatment and conditioning of the waste to alter the waste properties for efficiency and safety and final and near-surface storage that will allow the radioactivity to diminish. LLW (Low-level waste) and short-lived Intermediate-level waste (ILW) are normally sent immediately after packaging to near-surface facilities.

High-level waste (HLW) has to be cooled and shielded and normally has planned final placement in geologic repositories that will isolate and contain the waste for thousands of years. The geologic disposal of the waste has been the world agreement preferred method of the long-term management of HLW with the assurance that radionuclides will not be released into the biosphere at injurious concentrations

.Several agreements and treaties have been signed over the years for the disposal of radioactive waste safely. One of the first major agreements was in the 1972 London Convention, which regulated sea disposal of radioactive waste. Then in 1997, the Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management became effective, requiring universal standards for the storage and disposal of nuclear waste. All the conventions, supported by national law, have been the focal point for developing current radioactive waste disposal policy, with countries obligated to follow rigorous safety procedures.

One of the most profound implications of the agreements is the move towards deep underground repositories as the final long-term HLW storage option. Finland and Sweden have achieved considerable progress in the construction of deep underground repositories, which will house safe HLW containers for thousands of years. The United States also made an effort to construct the Yucca Mountain nuclear waste repository, which was delayed on political and environmental grounds. Despite the drawbacks, the creation of these repositories is of paramount significance in preventing long-term environmental contamination and saving future generations from the risks of radiation.

The impact of radioactive waste disposal on human life is proportional to the effectiveness of countermeasures being undertaken. Low effectiveness is of grave consequences, ranging from radioactive leakages contaminating water bodies and terrestrial soil to long-term health effects such as cancer and genetic mutations. Effective waste management procedures, however, maintain radiation exposure at trivial levels, and uses of nuclear energy and other radioactive material are permitted to benefit society without harm to public health.

The public image of radioactive waste management is also crucial to success. Hysteria and misinformation about nuclear waste have led to opposition to the development of nuclear energy in most places. But transparency and public education regarding waste disposal techniques and safety measures can dispel those fears. Industry and governments must come together to inform the public about what is being done with waste management and how technology and regulation are minimizing risks. That way, society can better balance the benefits of nuclear technology with environmental stewardship.

Conclusion

As our society advances and humanity develops its tools and technologies, the demand for renewable and powerful energy increases exponentially. While nuclear energy may appear as a promising source of potent energy, it poses many more dangers than it may seem at first. As of 2024, 32 countries possess nuclear reactors, with 440 power plants spread across the world. Nations worldwide are starting to invest more resources and funds into this potent power source, even though it presents more dangers than benefits.

Radioactive waste is a threat to the wellbeing of people and environments alike, tainting life and leaving a dark stain on the earth. Plants that take in radioactive energy can be killed off by it, and humans that consume radioactive waste are prone to having the DNA damaged and being more likely to contract cancer. It is of utmost importance for this issue to be dealt with in the most effective and sustainable way possible.

Guiding Questions

- What are the principal causes for the rapid increase in nuclear waste?
- How do the methods of waste disposal used today affect the environment and its inhabitants?
- What new methods and strategies can be implemented to sustainably store and dispose of radioactive waste?
- In what way can cooperation between nations be formed and strengthened to combat this problem?
- What measures and norms could be adopted to reduce the production of nuclear waste?

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