CERRITOS CONFERENCE 2021

Novice

IAEA

TOPIC:
NUCLEAR WASTE MANAGEMENT

DIRECTOR: EVELYN KIM

October 9th, 2021

To Delegates of CHSMUN Novice 2021

Dear Delegates,
Welcome to CHSMUN Novice 2021!

It is our highest honor and pleasure to welcome you all to our 2021 novice conference here at Cerritos High School. On behalf of the Cerritos High School Model United Nations program, we are proud to host this conference, where you will become more knowledgeable on international issues, participate in intellectually stimulating discussions, and create new and everlasting friendships.

The CHSMUN program continues to compete around the world as a nationally ranked MUN program. Our delegates utilize diplomacy in order to create complex solutions towards multilateral issues in the global community. Our head chairs are selected from only the best seniors of our program, undergoing a rigorous training process to ensure the highest quality of moderating and grading of debate. Furthermore, all the topic synopses have been reviewed and edited numerous times. We strongly believe that by providing each and every delegate with the necessary tools and understanding, he or she will have everything they need to thrive in all aspects of the committee. We thoroughly encourage each delegate to engage in all of the facets of their topic, in order to grow in their skills as a delegate and develop a greater knowledge of the world around them.

Although there will be a few changes to our conference due to Covid-19, our advisors and staff have put in countless hours to ensure delegates have an amazing experience. Our greatest hope is that from attending CHSMUN 2021, students are encouraged to continue on in Model United Nations and nevertheless, inspired to spark change in their surrounding communities. With this strong circuit consisting of over 500 delegates, CHSMUN Novice 2021 will provide a quality experience for beginner delegates to enhance their speaking and delegating skills.

If you have any questions, comments, or concerns, please contact us! We look forward to seeing you at CHSMUN Novice 2021!

Sincerely,

Anushka Panjwani & Naima Dellawar

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Secretary-Generals

A Note From The Director:

Delegates,

Hello! My name is Evelyn Kim and as a senior, it is my highest honor and pleasure to be serving as your Director for the International Atomic Energy Agency (IAEA) Committee. Impulsively joining this program four years ago was the best decision I have ever made. MUN has opened up so many opportunities for me to expand my knowledge in regard to international affairs and build valuable connections and relationships with my MUN peers. These long-term benefits gained from my firsthand experiences in MUN will truly help me in the long run. I can't wait to work with each and every one of you and pass on the same values I was taught through these experiences. Outside of MUN, I am involved in various club activities as California Scholarship Federation's President, Cerritos Wellness' Vice President, and Nationals Honors Society, Lighthouse, Young Leaders of Orange County, and J Student Reporters Program and Internship's members. In my free time, you can find me drawing, reading comic books, taking pictures, listening to music, overanalyzing films and music videos, and hanging out with friends. With that being said, I am excited to conduct debate with you guys on a topic that I am extremely passionate about. Nuclear waste management was my very first MUN topic and it probably is for some of you guys as well. I will be looking forward to working with each and every one of you in person. Although there is an uncertainty of how this year will progress, I will do everything in my power to make this conference a memory you will look back to with a smile. If you have any questions or concerns, feel free to contact me anytime! (I'm always awake) I wish you all the best of luck and see you very soon!

Sincerely,

Evelyn Kim

Director, IAEA

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Committee Introduction:

With the increasing popularity and fear of nuclear technology, the International Atomic Energy Agency (IAEA) was proposed by US President Eisenhower in December 1953 through his "Atoms for Peace" address to the General Assembly. Taking this into consideration, the IAEA was finally established in 1957 through the U.S. Ratification of the Statute by President Eisenhower. As a separate entity from the United States Government, the IAEA has served to encourage and undergo nuclear research, develop practical applications for atomic energy, and administer an internationally accepted set of standards to ensure nuclear safety. The Agency's activities are in alliance with the UN's ideals of peace and international cooperation as its members have made influential strides in the nuclear industry. After the Cold War, IAEA uncovered Iraq's nuclear program, confirmed the destruction of South Africa's nuclear technology, verified North Korea's nuclear activity, and supervised the removal of previous Soviet Union's nuclear weapons discovered in Belarus, Ukraine, and Kazachstan. The IAEA has also immediately responded to the Chernobyl Nuclear Power Plant accident in 1968 by demanding better safety standards and conditions for those who work under nuclear energy facilities. The mishandling of nuclear power has resulted in the IAEA's International Emergency Preparedness and Response (EPR) framework to strengthen the pre-existing safety responses and protocols for nuclear emergencies. Under the EPR, the IAEA Incident and Emergency System was established to provide assistance to member states who have suffered from nuclear accidents firsthand. These acts boil down to IAEA's role in the international community, as it consists of 173 member states aiming for nuclear development and safety.

Topic: Nuclear Waste Management

Background:

Nuclear power is generally known to produce large amounts of energy from very little fuel amount. However, the nuclear waste produced from the process can pose great harm to living beings and its surrounding environment. Exposure to radioactivity can damage human DNA and cells, thus leading individuals to suffer from diseases, infections, and death. Nuclear waste is the byproduct of an energy generation process caused by nuclear power plants and reactors. Due to its wide range of toxicity, the waste can be categorized into three different levels of radioactivity; low-level wastes, intermediate-level wastes, and high-level wastes. Low-level wastes are primarily generated from hospitals, medical industries, and nuclear fuel cycles. Papers, tools, and clothing exposed to low-level radioactivity do not require shielding during management and transport. Instead, the wastes are compacted and incinerated for disposal in near-surface facilities. Therefore, low-level wastes comprise 90% of the waste volume but only 1% of the wastes' total radioactivity. Intermediate-level wastes are far more radioactive and are in need of shielding when being transported from one facility to another. Intermediate wastes consist of toxic materials including chemical sludges, metal fuel cladding resins, and byproducts of reactor decommissioning. Its radioactivity requires the waste to be solidified in concrete or bitumen for proper disposal. It makes up 7% of the total waste volume and 4% of the waste's radioactivity. Lastly, high-level waste poses the greatest threat, as it increases in radioactivity and temperature and emits heat to its surroundings. High-level wastes are generated from the burning of uranium fuel, a nonrenewable energy source commonly found around the world. Its long-lived and high levels of radioactivity increase the time it will take for the waste to be considered as non-hazardous to human beings. Therefore, high-level wastes require an in-depth process of cooling, shielding, and storage in underground geological facilities to maintain human safety. When cooling, high-level wastes are placed in ponds of water or in dry casks for a minimum of five years. The wastes are later transported to ventilated storage vaults made of layers of steel and concrete thousands of feet underground. High-level wastes only take up 3% of the total waste volume but are responsible for 95% of the total radioactivity produced. Different waste levels require different geographic locations for safe and proper waste disposal. For example, the United States government has designated the Yucca Mountain to be their primary repository for nuclear waste disposal through the Nuclear Waste Policy Act of 1982. Since its establishment, the repository has successfully served as a deep geological storage facility to isolate waste from potential forms of life due to its location. The Yucca Mountains Repository is located in a deserted region in Nevada and away from population centers including Las Vegas. The waste that is stored in the repository is 1,000 feet underground and is enclosed in hydrologic basins within the facility. Lastly, the repository was constructed with robustly engineered barriers within geologic barriers, thus decreasing the likelihood of a nuclear leakage and emergency. Other countries that also model after the United State's Yucca Mountain depository include China, Finland, France, Germany, Hungary, India, Sweden, and the United Kingdom. However, improper nuclear waste disposal has increasingly become more common as those in charge make compromises to the original set of protocols and standards. As a result, serious consequences occur through nuclear energy accidents that affect the interior facility and exterior environment. For example, the Fukushima Nuclear Accident in 2011 was a consequence of improper management of the plant operator, Tokyo Electric and Power Company (TEPCO). Prior to the nuclear explosion and leakage, several tsunami waves damaged the backup generators at the Fukushima Daiichi plant on March 11, 2011. All three reactors successfully shut down in response to the tsunami and remained in control for a short period of time. However, the loss of power resulted in failing cooling systems and increased heat emission from the reactor's core. As a result, Reactors 1, 2, and 3 overheated their system, melted, and leaked toxic radiation into the atmosphere. Melted materials and holes from the heat resulted in a buildup of pressurized hydrogen gas in the outer containment. The increase in gas was later followed up with several explosions within the Fukushima facility. Following the explosion, government officials jumped into action by establishing a danger zone with a radius of 30 km extending around the Fukushima plant. Approximately 47,000 residents were asked to evacuate their homes away from radiation exposure. The radioactive material eventually seeped into the local food and water supplies. The material also contaminated nearby ocean water with high levels of iodine-131. With this in mind, the Japanese government immediately issued a warning and sealed the cracks of trenches and tunnels to prevent the spread of the contaminated water. Workers were also enforced to pump irradiated water into the storage buildings for proper treatment. This incident alone has consequently resulted in health and financial setbacks to nearby residents and the government. Those who were affected by accidental radiation consumption and exposure were at high risk of cancer, thyroid nodular diseases, parathyroid adenoma, leukemia, posterior subcapsular cataracts, and brain tumors. Workers who developed these diseases after the plant cleanup were compensated and awarded financially by the Japanese Ministry of Health, Labor, and Welfare. The cleanup itself had an expected cost of 50.5~71 trillion yen or $470~660 billion.

United Nations Involvement:

The collaboration with the United Nations and the IAEA has increased the number of proper disposal options for radioactive nuclear waste. This has been reflected through their IAEA Safety Standards which provide foundational requirements to ensure utmost safety for nuclear usage and disposal. Under the IAEA Safety standards, there are three sets of publications: the Safety Fundamentals, Safety Requirements, and Safety Guide. The first publication lays out the fundamental and foundational safety objectives for nuclear protection and safety. The second publication highlights the list of requirements needed to promote public and environmental safety. The last publication provides step-by-step guidance to undergo the requirements. Any activities that correlate with the usage, transportation, and disposal of nuclear material need to align with the regulations under IAEA's Safety Standards. Moreover, the United Nations and IAEA have made greater strides by providing a forum for nuclear waste disposal through the GEOSAF project. Overall, the project aimed to demonstrate the long-term safety of geological disposal facilities through the establishment of a UN infrastructure program for high-level waste and spent fuel disposal. The program required the licensing of nuclear waste facilities under integrated safety assessments and tests undergone by the United Nations team. The United Nations and the IAEA have recently acted upon nuclear waste management and transport through resolution GC(47)/RES/7 which was adopted by the UN in September 2003. The resolution highlights the need to increase financial efforts to support nuclear, transport, and waste safety within regions consisting of high technical communities. This request was backed up with a list of programs including the Agency's Safety Standards program and Nuclear, Radiation, Transport, and Waste Safety Educational Training. Both programs will cover the set of standards in regards to nuclear installation, radiation, radioactive waste management, safe decommissioning of nuclear activities, and international responses to nuclear emergencies.

Case Study: Chernobyl Disaster

On April 25th, prior to the Chernobyl disaster, a group of facility workers wanted to determine how long Chernobyl 4's long turbines would spin and supply power to the main pumps through a series of experiments. However, the tests were followed up with a loss of the main electrical power supply, disabling the system's automatic shutdown mechanisms. By the time the operator began to shut down the its system, the reactor was in a dangerous condition due to the poor design of the control rods. The unstable conditions eventually led to the interaction of hot fuel and cooling water, increasing the pressure within the reactor. Eventually, the Chernobyl 4 reactor was destroyed, resulting in steam explosions and fires within the disposal facility and its surrounding environment. The 1986 Chernobyl nuclear power plant disaster in Ukraine was a consequence of a flawed reactor system and improperly trained facility workers. The explosions alone released a total of 5% of radioactive material into the environment, directly contributing to the death of two Chernobyl plant workers that same evening. Following this, a total of 237 people who were involved with the cleanup onsite were diagnosed with acute radiation syndrome (ARS), and 135 confirmed cases. Of the 135, twenty-eight individuals died a few weeks after the disaster and nineteen died between the time period of 1987-2004. Workers located offsite did not suffer from direct effects of acute radiation syndrome. Instead, a fraction of the offsite workers were diagnosed with thyroid cancer due to the consumption of radioactive iodine and caesium fallout. For approximately 10 days, Belarus, Russia, and Ukraine suffered from social and economic setbacks due to the uncontrolled release of radioactive chemicals and gas. The countries called for a recovery and clean-up team made up of 600,000 people to contain the spread of radioactive materials. In the following years of the Chernobyl disaster, 45,000 residents were evacuated and displaced from their homes. Many were forced to resettle past the 4300 km radius exclusion zone to avoid radioactive exposure.

Bloc Positions:

Western Bloc: Although the United States has significantly advanced its nuclear technology within the past decades, they have struggled to manage their piling of nuclear wastes. Approximately 90,000 metric tons of nuclear waste in the United States require disposal and are instead located in temporary storage units. The United States has established permanent disposal sites like the Yucca Mountain Nuclear Waste Repository through the passage of the Nuclear Waste Policy Act in 1987. However, its limited space has left the majority of the United State's nuclear waste to be vulnerable to wildfires, rising sea levels, and hurricanes. Under the Nuclear Waste Management Organization (NWMO), Canada has made greater strides to promote nuclear disposal safety. The organization primarily focuses on short-term solutions where nuclear wastes are placed in large containers with a minimum design life of 50 years. Through Adaptive Phased Management, the containers are actively monitored with hopes to decrease the waste's radioactivity levels over time. All of Canada's nuclear fuel and wastes are safely managed within licensed facilities and laboratories. Lastly, the European Union actively takes part in nuclear waste management through the EURATOM treaty. The legislation serves as the EU's legal basis and set of standards for waste disposal. Many European countries align their policies with the treaty and have continued to properly carry out safe nuclear energy usage and disposal within their facilities.

Latin America and the Caribbean Bloc: Unlike the western bloc, Latin American and Caribbean regions have not heavily involved themselves with nuclear technology and wastes. Despite being fairly new, the regions have worked hand in hand with IAEA when removing unused radioactive sources and materials. In 2018, the IAEA and the Latin American and Caribbean bloc removed a total of 27 radioactive sources from Bolivia, Ecuador, Paraguay, Peru, and Uruguay. The discovered radioactive material was found in old hospitals and was later transported to Germany for recycling. In recent years, the IAEA has directly provided assistance to Bosnia, Herzegovina, Cameroon, Costa Rica, and Honduras through training, technical advice, peer review, and advisory services to better their pre-existing nuclear waste management programs.

African Bloc: With South Africa being the only African country to use nuclear technology, the National Radioactive Waste Disposal Institute Act of 2008 was drafted and fully effective in 2009 to establish the National Radioactive Waste Disposal Institute (NRWDI) within South Africa. The organization maintains a national radioactive waste database and implements institutional control over the Vaalputs Nuclear Waste Repository alongside NESCA. Vaalputs store the nuclear wastes produced from South Africa's Koeberg Nuclear Power Station. In recent years, the IAEA has initiated the African Regional Cooperative Agreement for Research, Development and Training related to Nuclear Science and Technology (AFRA) to strengthen the African countries' legal infrastructure for nuclear safety and security with funding from the European Union.

Asian-Pacific Bloc: Many Asian countries are leaders of the nuclear technology industry and are in need of greater responsibility for waste management and disposal. In the Asian Pacific bloc, there are a total of 135 operable nuclear power reactors and 30-35 construction plans to build an additional 50-60 reactors. This includes countries from China, India, Japan, South Korea, and Pakistan. Adopting western and indigenous reactor designs, China is moving rapidly ahead in nuclear power plant construction. Under the China National Nuclear Corp (CNNC), the 50 nuclear plants must follow the national policies on proper waste management and construction of the deep geological repository. With 23 operable reactors, the Indian government is committed to growing its nuclear power usage through the nuclear fuel cycle. However, India has not taken full responsibility for the thousands of deaths caused by the dumping of nuclear wastes in the Subarnarekha River. The river is percolated with high levels of carcinogens, arsenic, and other heavy metals and have caused harm to residents' physical health.

Basic Solutions:

Taking financial and environmental factors into consideration, delegates should highlight long-term and sustainable solutions when promoting the proper disposal of nuclear waste. A common practice used by many nuclear technology leaders include long-term nuclear waste storage. Storage location differs based on radioactivity level. Therefore, low and intermediate wastes are often stored in near-surface disposal facilities located on ground level or ten meters below. Whereas, long-lived intermediate and high-level wastes are stored in deep geological disposal deposits that are 250 meters to 5000 meters below ground level. The highest levels of wastes can take up to fifty to thousands of years of storage before proper disposal. Long term storage gives the wastes the opportunity to decrease in radioactivity and avoid extreme radioactive exposure to those handling it. Delegates should also consider the political aspects of nuclear waste management by increasing transparency between countries. For example, the RISCOM II Project represents the effort of five European countries, increasing transparency and public participation in proper nuclear waste management. The countries involved include Sweden, France, United Kingdom, Czechia, and Finland. Through this collaboration, the countries have used scientific procedural methods under a consistent framework to map out a set of standards when undergoing dialogue and hearing formats. This model has been used during public events and decision processes to improve transparency and inclusivity between countries. This project has also worked hand in hand with NGO representatives so that their views will be taken into account during decision making processes. This is a method of proper resourcing which ultimately results in an increase in positive engagement and public confidence.

Questions to Consider:

1. Is your country heavily involved in the nuclear technology and management industry? Does your country manage its own waste?
2. What are some appropriate standards for determining if a certain geological location is suitable for nuclear waste disposal?
3. How can countries guarantee that their nuclear waste disposal facilities and repositories are secure and sustainable for a long period of time?
4. What are some safety protocols and standards that need to be addressed in an event of a nuclear emergency and accident?

5. What are some methods that countries can apply to prevent the cost of nuclear waste cleanup from escalating over time?

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