HoMMUNC

International Atomic Energy Agency

Chair: Alex Vogelsang

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Dear Delegates,

My name is Alex Vogelsang and I am very excited to join the HoMMUNC's International Atomic Energy Agency for the first time! I am a senior at Horace Mann School and one of the Presidents of Horace Mann's Model Congress Team. As you could have guessed, I am interested in history and political science, as well as mathematics. I'm also on HM's varsity volleyball team, an active member of our theater company, and one of the editors in chief of our fashion magazine, so when I'm not in classes you can usually find me in the gym, theater or student publications room.

Debate at HM has taught me how to be a well-informed, active political participant, and I hope that over the course of HoMMUNC I can share my passion for power dynamics in government and well-constructed debate with all of you. Noa, my co-chair, and I are looking forward to a day of heated debate over the issues of North Korea's nuclear situation and international nuclear protection efforts. I hope that while finding solutions to these pertinent global issues you will also use the opportunity to become an effective, well-informed leader among your peers.

The issues addressed in IAEA are some of the most fragile and controversial, and I hope you both enjoy debating them and get a sense for concerns across our borders to the international community. Over the course of the conference, you will be expected to write, argue, get shot down, adapt and repeat. Active participation in debate truly has the power to make us better thinkers, better listeners, and better problem solvers. Get excited. In the following background guide, you will start your research – but by no means should it end there.

Sincerely,

Alex Vogelsang

Committee Background

The International Atomic Energy Agency (IAEA) was established in 1957 with the hope to maintain "Atomic Peace" within the international community. It works with member states and various partners to ensure safe and peaceful nuclear technology manufacturing and usage. The IAEA secretariat is located in the Vienna International Center in Vienna, Austria with regional offices in Geneva, Switzerland; New York, USA; Toronto, Canada; and Tokyo, Japan. The Secretariat consists of 2,300 members of staff (both professional and support) and is lead by Director General Yukiya Amano, along with six Deputy Directors General. The IAEA is considered an independent international organization that works under the aegis of the United Nations and meets with the UN General Assembly and the UN Security Council annually to discuss yearly achievements and implementations. Article III of the IAEA Statute outlines its seven functions:

1. To encourage and assist research on, and development and practical application of, atomic energy for peaceful uses throughout the world; and, if requested to do so, to act as an intermediary for the purposes of securing the performance of services or the supplying of materials, equipment, or facilities by one member of the Agency for another; and to perform any operation or service useful in research on, or development or practical application of, atomic energy for peaceful purposes;

2. To make provision, in accordance with this Statute, for materials, services, equipment, and facilities to meet the needs of research on, and development and practical application of, atomic energy for peaceful purposes, including the production of electric power, with due consideration for the needs of the under-developed areas of the world;3. To foster the exchange of scientific and technical information on peaceful uses of atomic energy;

4. To encourage the exchange of training of scientists and experts in the field of peaceful uses of atomic energy;

5. To establish and administer safeguards designed to ensure that special fissionable and other materials, services, equipment, facilities, and information made available by the Agency or at its request or under its supervision or control are not used in such a way as to further any military purpose; and to apply safeguards, at the request of the parties, to any bilateral or multilateral arrangement, or at the request of a State, to any of that State's activities in the field of atomic energy;

6. To establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property (including such standards for labour conditions), and to provide for the application of these standards to its own operation as well as to the operations making use of materials, services, equipment, facilities, and information made available by the Agency or at its request or under its control or supervision; and to provide for the application of these standards, at the request of the parties, to operations under any bilateral or multilateral arrangements, or, at the request of a State, to any of that State's activities in the field of atomic energy;

7. To acquire or establish any facilities, plant and equipment useful in carrying out its authorized functions, whenever the facilities, plant, and equipment otherwise available to it in the area concerned are inadequate or available only on terms it deems unsatisfactory.

An annual report is issued every July that includes the organizations activity and achievements.

The IAEA serves as an “intergovernmental forum for scientific and technological cooperation,” and is guided by the needs and cultivation of the modern world’s peaceful use of nuclear power. Working under three main pillars of interest: Safety and Security; Science and Technology; and Safeguards and Verification, the IAEA works toward "safe, secure and peaceful uses of nuclear sciences and technology" (Pillars 2005).

IAEA

International Atomic Energy Agency

Atoms For Peace

TOPIC A: The Nuclear Situation in North Korea

Historical Background

The allied victory in World War II terminated Japan's 35-year colonial supremacy over the Korean peninsula. To strengthen the newly freed nation, the country would be temporarily divided into two spheres of influence: the North, under the Soviet Union and the South, under the United States of America. As agreed, when the soviet forces reached the 38th parallel by the end of the Second World War, they waited for the arrival of the western allies who would administer the southern region while the Soviets were responsible for the North. In the elections (held in 1948) in the South, and under UN supervision, the Republic of Korea (ROK.) was established, while in the North, the Democratic People's Republic of Korea (DPRK) came into being. While there may have been hopes of unification, in reality, the two regions had developed separately; they formed individual ideologies, cultures and, ultimately, nations. Once the allied forces withdrew from the South in 1949, the North launched a "liberation" attack in 1950. With United Nations approval, an international military force was created and led by the United States. The Korean War (1950-1953) restored and formalized the separation of the "two Koreas" by the 38th parallel (also know as the demilitarized zone or the DMZ): a 160-mile long, 4 mile wide stretch of land between the DPRK and the ROK. Apart from the devastation the war caused in Korea, it also brought fears of a nuclear confrontation about the peninsula between the two global powers as they both had direct interests in the outcome of the war. Overtime, the South remained closely allied to the US while the North slowly replaced its association with the Soviet Union with a strong bond to the newly created (1949)

Chinese leadership under Chairman Mao. The Korean War "ended" in stalemate. The armistice signed enforced a tentative cessation in hostilities. Technically, the Korean War is, to this day, taking place.

Consequently, in many ways the essential elements of the issues that plague the area even today can already been seen at that time: two states both claiming to be "Korea" with sharply differing ideologies, important UN interventions, global power interest and nuclear concerns. To understand today's issues, the 1950s provide the key.

By the 1950s, North Korea began developing institutional training and providing educational opportunity for nuclear programs, setting up organizations such as the Atomic Energy Research Institute (1952) and the Academy of Sciences (1952). However, work on nuclear technology only began to advance in 1956 when North Korea signed the Soviet Union's Joint Institute for Nuclear Research Charter in February of that year. North Korean scientists were sent to the USSR for training shortly thereafter. By 1959, the two nations agreed on the peaceful use of nuclear energy and, with the help of the Soviet Union, the DPRK constructed a large-scale energy research-complex in Yongbyon, North Pyongan Province.

Yongbyon, North Korea

1977 marked North Korea's initial agreement to collaborate with the IAEA, granting permission for the agency's inspection of its 2MW research reactor and 0.1MW critical assembly facility at Yongbyon. In July, it signed a trilateral safeguard agreement with the IAEA and the USSR, which aimed to create a system of surveillance and a verification of treaty compliance while it was accepting the IRT-2000 research reactor and a critical assembly into Yongbyon from the Soviet Union.

Again, around 10 years later, North Korea found itself under renewed international pressure to have its nuclear powers reevaluated, especially, as its policies continued to generate concern with the Western powers and South Korea. On December 12, 1985 the country signed the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as a non-nuclear weapon state. The NPT, drafted in 1968 with the hope to prevent the spread of nuclear weaponry and weapon technology, became operative in 1970. It includes 190 states-parties that are divided into two categories: nuclear-weapon states and non-nuclear-weapon states. Under the NPT, nuclear-weapon states were required to limit the number of weapons being manufactured and to ensure the technology for these weapons was not circulated around the global community. Non-nuclear weapon states would agree to not pursue technology or advancement in the creation of such weapons. However, those without nuclear weapons were free to advance and proceed in working with nuclear energy but solely for nonmilitant usage. North Korea's compliance with the treaty presented the international community with the statement that North Korea had no intention of creating nuclear weapons.

On January 30, 1992, North Korea signed the IAEA's safeguard agreement. Under this agreement, IAEA inspectors were allocated six rounds of inspection starting in May and ending in February of 1993. However, that same year, North Korea's nuclear program came under suspicion. Enriched plutonium and uranium were found by the IAEA in North Korea's nuclear facilities, and while uranium is a radioactive element that is commonly used to power nuclear plants, plutonium is almost exclusively used for nuclear bombs and other forms of nuclear weaponry. The analysis also showed that the plutonium was reprocessed three times – in 1989, 1990, and 1991, however, the suspected reprocessing sites were closed off to the IAEA under North Korean claims that they were military sites (and consequently, off-limits). After being denied entry, the IAEA requested specialized ad hoc inspections to the UNSC. On March 12, 1993, in response to this request, North Korea issued an intention to withdraw from the Nuclear Non-Proliferation Treaty. Under the outlining of the treaty, withdrawal requests are only taken into affect after 90 days, and, on the 89th day, after intense bilateral talks mainly between North Korea and the United States, North Korea agreed to stay under the NPT with "special arrangements" regarding its nuclear protection equipment.

From 1993 onwards, North Korea was accused of increasingly defying its international obligations for the nuclear programs. On May 14, 1994, technicians removed fuel rods of their reactors without IAEA consent. In 2002, U.S. intelligence found HEU technology transports between the DPRK and Pakistan in exchange for military projectiles. Along with these "under the table" agreements, underground nuclear testing was revealed multiple times; in 2002, US intelligence found out about a secret nuclear program that the DPRK had agreed to halt in 1995. These examples and many others, increasingly made the North Korean issue a point of severe contention between North Korea and the other co-signatories of the NPT; North Korea's work regarding nuclear weaponry and technology troubled nations worldwide. Finally, on January 10th, 2003, North Korea did what everyone feared it would do and withdrew (effective immediately) from the NPT, ridding it of any agreements and restrictions the safeguards of the IAEA placed it under.

Since leaving the NPT, the Korean Nuclear issue has continued to be a major point of international concern. For example, in early 2004, North Korea (along with Iran and Libya) bought gas-centrifuge technology from Pakistani nuclear scientist Dr. A. Q. Kahn. This technology is uniquely used for weaponizing nuclear fuel and caused international alarm. This happened again in 2009 when North Korea was found to be conducting a nuclear test despite its agreement to denuclearize in 2007 in exchange for fuel assistance.

Past Solutions

Dealing with North Korea's nuclear power has been a continuous struggle for the international community. As a totalitarian communist regime under the dictatorship of the Kim family and dealing so often in secrecy, there is little direct communication between the DPRK and the rest of the world. For years, there has been international attempt to negotiate with North Korea in the hopes to end its nuclear and missile development and its export of ballistic missile technology. This issue is further complicated because, although bolstered by early assistance from Moscow, and to some extent Beijing, North Korea's nuclear program has developed largely without significant foreign assistance and is thus, is less susceptible to foreign pressure.

The United Nations Security Council has attempted to restrain North Korea in its nuclear ambitions with multiple sanctions, including Resolution 1695, Resolution 1718, Resolution 1874, and Resolution 2087. These resolutions urged North Korea to halt its nuclear activity and condemned its actions. Along with sanctions, the UN has withheld economic assistance that has been provided to North Korea in the past. This economic assistance is vital to North Korea, given its disastrous economic performance (especially in comparison to that of the South). With a GDP per capita of less that 200 USD (versus South Koreas's 22,424 USD) it places 165th out of 195 countries in this metric.

Implementing diplomatic pressure has been a popular route taken when considering North Korea and nuclear technology/energy. The 1994 Agreed Framework between the United States and the DPRK attempted to find a compromise that both sides were willing to accept. The agreement included: replacing a nuclear reactor with light water reactors, renewed economic relations (on both sides), the DPRK would remain in the NPT, the IAEA would continue ad hoc inspections, the US would formalize agreements to ensure no nuclear threat on North Korea, and provisional aid from the US to North Korea. However, complications involving the US Congress control (which changed from Democratic to Republican) along with HEU intelligence inspections that claimed continued nuclear work in North Korea, the 1994 Agreed Framework collapsed. However, while the international body realizes the failure of the Framework, there has been talk of a revised and replacement framework. Immediately after North Korea's retreat from the NPT in 2003, six countries: the Democratic People's Republic of Korea, the Republic of Korea, China, the Russian Federation, Japan, and the United States, agreed on the 6-Party Talks; a negotiation involving these six nations that aimed to terminate North Korea's nuclear weapon assembly through compromises. The Six Party Talks made several strides toward success and, since its stall in 2008, has been reinstated. The Joint Statement at the fourth round of talks expressed the parties' intent to pursue the complete denuclearization of the Korean Peninsula. It allowed for the normalization of relations between the U.S. and North Korea through an "action-for-action" approach where the parties involved would reciprocate steps each other made. However after the U.S. froze North Korea assets, the DPRK repudiated their previous agreement and tested a nuclear weapon (resulting in the Security Council's 1718 Resolution).

In attempting to solve the issue, countries have not only focused on nuclear-specific solutions but have worked on general diplomatic relationships with North Korea. In 1998, the Sunshine Policy, (established by the South Korean President, Kim Dae Jung) was geared towards diplomacy and set interaction between the ROK and the DPRK in motion. This policy was harbored under the hope of reconciliation between the two nations and South Korea made efforts to engage the DPRK. It attempted to open a rail link between the two countries, providing hundreds of millions of dollars to the DPRK's new leader Kim Jong-Il, and offering food and fertilizer.

When considering solutions, it is vital to establish results that countries on both sides of the issue can agree to. In seeking compromises, four issues stand out. First, North Korea is notorious for its unpredictability. Christopher Hill, Washington's former chief envoy has claimed "They know that we have a tough time figuring out what really motivates them." When instituting solutions, it is vital to ensure decisions are made that acknowledge North Korea's volatility and try to mitigate against surprise. Second, while the six nations have agreed to come together (in regards to the Six Party Talks), it is imperative to consider their differing approaches, especially as the major powers in the Six Party all have varying global interests. The Council of Foreign Relation's Senior Fellow for Korea Studies and Director of the Program on U.S.-Korea Policy, Scott A. Snyder, claims the problem that the Six Party Talks face is that the individual countries "placed their own immediate priorities and concerns above the collective need to halt North Korea's nuclear program." Third, it is important to note that the current military presence around the 38th parallel with the close proximity of two opposing forces holds the potential for unintended escalation. And fourth, North Korea's international relations are currently only meaningful and significant with China yet, even China's influence has been challenged recently.

Bloc Positions

• *The Democratic People's Republic of Korea*: The DPRK has not clearly outlined the intentions of its nuclear program but first and foremost Kim Jong-Il and the ruling elite wish to maintain their political status. Although instigating the West to a point of no return would not be advantageous for the government, Kim Jong-Il has track record of acting erratically.

• *The Republic of Korea*: The ROK and the DPRK are notorious enemies, however, recent discussions and attempts (mainly on ROK's side) to establish working relationships with each other have been occurring. ROK's main fear in regards to North Korea's nuclear program is its geographic location, which places it in a proximity whereby, if the DPRK attacks, the nation will be in immediate danger.

• *The United States of America*: Being a strong supporter and ally of South Korea since its establishment, the US has promised to intervene if an attack is made on the ROK due to the ROK-US mutual defense agreement.

• *Japan:* Similar to the ROK, Japan's geographic location jeopardizes its safety with regards to North Korea's nuclear weaponry, therefore making it desperate for nuclear elimination.

• *China:* China is clearly North Korea's closest ally and has come to its aid in the past. However, China recognizes that the delicate balance of power in East Asia is being undermined by North Korea's nuclear program and therefore is publicly opposed to North Korea pursuing nuclear weapons.

• *The Russian Federation*: Russia wishes to prevent conflict in the region, as warfare might result in forced response using its own military force. However, Russia wants to minimize American dominion and therefore might be resistant to a strong rebuke of North Korea.

• *European Union*: Many European countries are in close trading relationships with South Korea, and therefore, condemn the DPRK's threats and instigations.

Questions to Consider:

- How do you plan to implement change under the IAEA's 3 pillars of work; Safety and Security; Science and Technology; and Safeguards and Verification?
- What sanctions, if any, should the global populace implement on North Korea, how are you going to ensure these embargoes are acted on?
- What can the global community present North Korea with so that they will consider agreements and discussion?
- To what extent should countries consider nuclear defense?
- What can be implemented to ensure long-term, rather than short-term, trust and safety regarding North Korea's nuclear program?
- Should the international community aim to manage the DPRK's nuclear program or eliminate it?

• http://www.korea-dpr.com/founding_dprk.html
• http://www.asil.org/insigh96.cfm
• http://www.un.org/en/sc/documents/resolutions/2012.shtml
• http://www.nti.org/country-profiles/north-korea/nuclear/
• http://www.armscontrol.org/factsheets/nptfact
• http://www.dfat.gov.au/security/npt.html
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• http://www.iaea.org/newscenter/news/2011/nuclearpowersafer.html
• http://www.iaea.org/About/Policy/GC/GC56/GC56InfDocuments/English/gc56inf-5-att1_en.pdf

TOPIC B: Nuclear Protection

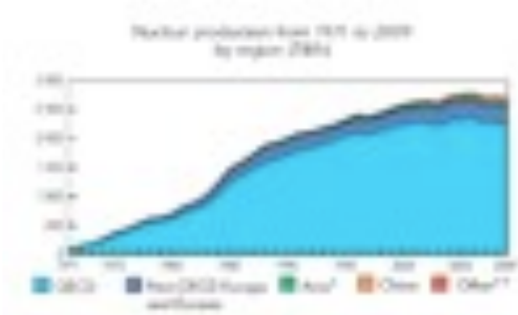
Introduction

Nuclear power uses exothermic nuclear processes to produce heat or energy. Most nuclear energy uses enriched uranium for successful nuclear power even though some technologies use other actinide series' elements. A 2013 IAEA report claims there are currently 437 operating nuclear power reactors in 31 countries across the globe. While nuclear energy/technology is not used in all countries, the inherent risks of nuclear energy generation extend beyond national borders and therefore make the concern of security and safety in nuclear facilities an inherently global issue. As delegates in the IAEA, it will be your job to decide whether or not the safety standards need updating or improving based on the impacts of past disasters such as Fukushima and Chernobyl.

Nuclear energy relies on renewable sources and does not produce greenhouse gases as it is a low-carbon producer. The usage of nuclear energy since the 1970s has therefore "prevented" emission into the atmosphere of approximately 64 gigatonnes of carbon dioxide gas that would have resulted from burning fossil fuels in thermal power plants.

Nuclear energy is mainly produced through nuclear fission: a chemical reaction in the nucleus of the atom that splits it and consequently, generates energy. To achieve a useful nuclear reaction, Uranium-235 is needed; a relatively rare isotope of Uranium. The process of increasing the percentage of U-235 versus U-238 in Uranium is called "enriching". In nature, Uranium contains only 0.72% U-235, nuclear reactors require 4-6% U-235, while weaponized uranium contains approximately 90% U-235. Uranium is commonly used in reactors because it naturally undergoes fission at a slow rate and therefore, is one of the few elements that allow us to harness nuclear energy. The decay of a single U-235 atom releases approximately 200 MeV (million electron volts) and while this might not seem like much, a pound of enriched uranium is the effective equivalent to about a million gallons of gasoline in energy generation.

However, to turn nuclear fission into useful energy, the energy emitted by the enriched uranium fission process must be controlled, as a self-reinforcing destructive cycle can lead to "melt down". Thus, the heat of the reactor must be regulated as the uranium can overheat and melt if not monitored. Control rods are placed in the reactor to prevent overheating, however, issues with overheating have shown to pose problems in the past.



The “spent” nuclear power rods, once removed from the nuclear reactor, remain radioactive for a long period of time (10,000-millions of years, depending on the rods) and a permanent solution to the nuclear waste problem, other than long-term storage, has not been found.

Pros and Cons of Nuclear Energy:

When considering the negatives associated with nuclear energy, there are issues surrounding the actual generation of energy, as well as with what comes before and after. Historically, mining and enriching Uranium hasn't been very ecofriendly; the methods used and the transportation provided both have shown to be quite damaging to the surrounding environment. Similarly, transporting nuclear fuel to and from plants can result in contamination. Considering the aftermath of creating nuclear energy, dealing with spent nuclear fuel is complicated; it is still radioactive and potentially deadly, therefore general waste elimination systems are not plausible options. On average, about 20 metric tons of nuclear waste are created per power plant, per year, approximating at about 9,000 metric tons of waste globally. All of this waste emits radiation and heat that will eventually corrode any container it is placed in, proving lethal to nearby life forms. Additionally, nuclear power plants produce a great deal of low-level radioactive waste in the form of radiated parts and equipment. Nuclear fuel will decay to safe radioactive levels, however, this process takes tens of thousands of years. Even lower-level radioactive waste requires centuries to reach acceptable levels.

Currently, there are two techniques to storing waste; wet storage and dry storage. Wet storage contains spent nuclear fuel in rods in pools of water. The rods must be submerged under at least 20 feet of water to provide adequate protection for anyone in close proximity with the pool. Dry storage was invented after wet storage. Its initial installation was licensed by the NRC in 1986. In dry storage, spent fuel is surrounded by inert gas inside a container called a cask. The casks can be made of metal or concrete and have been also used as transportation vessels. Seventeen US nuclear power plants are currently storing spent fuel under the dry storage option. Regardless of which technique a plant uses, radioactive waste has to be maintained, monitored and guarded, adding materials and costing more money.

The size of the power plants is also important to consider. While an individual plant only takes up about 200-400 acres (as opposed to a single wind farm that generates the same amount of energy but takes up 150,000-180,000 acres), the toxicity of the by-products makes the land impossible to reuse. The debate over health and radioactivity is ongoing; while it is scientifically proven that extensive exposure to radiation kills, the connection between cancer and those living in the vicinity of nuclear power plants is arguable, with advocates claiming strong correlation and opponents relying on regulatory safety mechanisms. The latter note that the U.S. Nuclear Regulatory Commission did not find a significant increase in cancer rates among adults and children residing in the 107 counties near nuclear facilities. Of course, the arguably most important issue when considering nuclear energy is its potential for proliferation of nuclear weaponry; much of the technology to enrich Uranium to nuclear plant levels (4%) can also be used to enrich the Uranium further, even to create weapon-rate quality (90%). There are currently eight countries that have openly claimed to harboring nuclear weapons. The expansion of nuclear arms is an international issue that must be considered when discussing nuclear protection.

While there are major concerns with nuclear energy, there are clear advantages to the technology as well. The absence of fossil fuel and its waste (especially CO_2) makes nuclear power a much more environmentally-friendly energy option; while the iconic depictions of nuclear power plants, that are sometimes highlighted by anti-nuclear activists, exhibit smoke rising from towers, the only gas actually being emitted is harmless water vapor. Nuclear power plants also hold an economic advantage, thereby, freeing resources for other uses; nuclear power produces more kilowatts of energy than coal, wind or solar power per dollar. As more plants are built, it is expected that construction costs will come down, as well as the maintenance cost of the plant along with the aforementioned waste storage expenditures, thus, raising the cost-effectiveness of nuclear-generated electricity even more. There are many claims that the economic advantages ascribed to nuclear energy are particularly valuable for developing nations. Developing countries wouldn't have to rely on expensive fossil fuels that emit large volumes of carbon dioxide or imported oil/gas and instead, turn to nuclear energy, which would improve the environmental balance and free resources for much needed other uses. Therefore, there is global interest in investing in nuclear power given the potential to present emerging economies with increased wealth and thus, creating jobs within communities and cities.

Past Disasters

When considering the global history of nuclear power, most will argue that there have been three significant disasters: Three Mile Island in the United States (1979), Chernobyl in Ukraine (1986), and Fukushima in Japan (2011). All three calamities caused highlighted concern within the nuclear industry and, to this day, are huge factors in the debate about nuclear protection.

On March 28, 1979, the Three Mile Island Unit 2 (TMI-2) reactor near Middleton, Pa partially melted down. Whether the cause of the accident was mechanical or electrical is not clear, however, it resulted in a failure of the main feed-water pumps to send water to the steam generators (that remove heat from the reactor core), which in turn, lead to the partial meltdown. Many claim it was the absence of key instruments within the plant that resulted in the overheating. For example, there was no instrument that showed how much water covered the core, and as a result, the staff assumed that as long as the pressurizer water level was high, the core was properly covered with water. While the TMI-2 reactor was severely damaged, the building remained intact (most importantly the containment structure) and almost all of the radioactive material was kept within walls. Being the first large nuclear disaster, federal and state authorities were deeply concerned about the small discharges of radioactive gases during the incident and even more worried about the potential threat (in case of a full meltdown and possible rupture of the containment structure) to the surrounding population. It has been approximated that the 2 million people surrounding the TMI-2 during the accident did receive about 1 millirem above the usual background radiation level, but that amount is negligible considering a human is subject to 6 millirem during simple and procedural chest x-rays. It has been concluded that in spite of serious damage to the reactor, the actual release had insignificant effects on the physical health of individuals or the surrounding environment. While Three Mile Island did raise serious concerns, it is almost insignificant in its damages when compared to the other two major nuclear accidents.

To this day Chernobyl is one of the two nuclear power disasters (along with Fukushima) that have been rated a level 7 event on the International Nuclear Event Scale. On April 25, 1986 an explosion and fire at a plant in Chernobyl, Ukraine released large quantities of radioactive particles into the atmosphere, spreading throughout the USSR and Europe. What made the Chernobyl incident so particularly troublesome is that the containment structure was ruptured. Many claim the disaster occurred due to a flawed reactor design that was operated with inadequately trained personnel. At least 5% of the reactor’s core was released into the open atmosphere, (about 5200 PBq [I-131 eq]), permanently destroying Reactor 4.

Unlike Three Mile Island, there were casualties. Two plant workers died the night of the accident and another 28 staff members died within a few weeks due to acute radiation poisoning. While nobody off-site suffered from acute radiation effects, a sizable amount of childhood thyroid cancers were diagnosed in the individuals who had been exposed to the excess radiation immediately following the incident. Many doctors have assumed these cases to be due to intake of radioactive iodine fallout. Chernobyl proved what many individuals feared; while nuclear energy is incredibly useful it can also be dangerous. The disaster at Chernobyl exemplified the risks individuals need to accept when deciding to work in a plant or live in the surrounding areas. Governments now needed to reevaluate the possibility of utilizing nuclear energy; would they still subject their citizens to it?

While both the Three Mile Island (1979) and Chernobyl (1986) accidents can be considered "outdated," and related to older nuclear plant designs, what happened in Fukushima, Japan in 2011 exemplifies that the accidents and affects of malfunctions in nuclear power plants are not behind us. On March 11, 2011, a major earthquake off the northeastern coast of Japan created a 15-meter tsunami, which caused deactivation of the power supply and cooling of three reactors at the Fukushima Daiichi Nuclear Power Plant. The entire Fukushima Daiichi plant was flooded and lost power at 3:42 pm, almost an hour after the quake. This disabled 12 of 13 back-up generators on site and the heat exchangers, which release reactor waste heat and decay heat into the sea. All the units on site became unable to sustain proper reactor cooling and water circulation, and the electrical switchgear was disabled. While there were no cases of immediate death due to radiation in wake of the tsunami, in contrast, about 18,500 Japanese died elsewhere in Japan due to accidents and illness relating to the tsunami and earthquake but not to the nuclear industry. However, over 100,000 individuals had to evacuate their homes due to radiation fears. Fukushima, again, set back the nuclear industry and resulted in serious reevaluation and fierce criticism especially as possible sea and air contamination could affect countries as far as China or even, the United States. After the disaster, the *Economist* defined nuclear power as "a dream that failed" and concluded that "Nuclear power will not go away, but its role may never be more than marginal." Not surprisingly, the market value of shares of Areva (the core French nuclear company) halved from €30 in February 2011 to €14.75 in February 2013.

All three disasters brought alarm and panic to the international community regarding nuclear power. After Three Mile Island it appeared that even a serious accident would be unlikely to do public harm as it appeared that the containment technology and safety apparatus was sufficiently developed to avoid catastrophic failure. In some ways, Three Mile Island could be said to have increased confidence in nuclear power. However, the Chernobyl disaster showed that containment concerns were real and deep, not only did the Soviet nuclear industry incur vast expenses, other countries suffered as well. Still, hope could be found in the belief that design improvements would reduce catastrophic risks in the future. Nonetheless, the Fukushima accident showed that despite design improvements, significant risk remained while the nation's lack of readiness worsened both the national and international affects of nuclear disasters. The problems that result from such accidents cannot be contained by borders and often contaminate other neighboring countries as well; the radiation cloud, subsequent to the Chernobyl disaster, traveled all over Europe.

Past Action

Throughout its history, nuclear technology has continuously been updated and changed. Hundreds of organizations have been created to maintain, protect, and modernize nuclear power plants. After each accident, we see a new proliferation of organizations and foundations that hope to tackle whatever mishap occurred. After Chernobyl, the World Association of Nuclear Operators (WANO) formed to share experience and knowledge of nuclear functions. Similarly, the IAEA placed cutting-edge policies and strategies concerning nuclear disasters at the forefront of its agenda to establish widespread practice standards. Similarly, at the Johannesburg World Summit on Sustainable Development (WSSD) in 2002, the IAEA announced its Major Programme 2 which explored the ways in which peaceful nuclear applications can and do improve the daily lives of people around the world. The IAEA concluded five areas in which nuclear power could be used practically, beyond safe nuclear power generation: food and agriculture (through working with FAO and biotechnologies to help improve sustainable food security), human health (nuclear/radiation technologies have been proven helpful in the diagnosis and treatment of diseases including cancer and cardiovascular disease), water resources (the IAEA'S Isotope Hydrology Technology further betters the quality management and availability of water), marine and terrestrial environments (thought monitoring and protecting both land and water environments through the usage of radio-analytical technologies and sharing such technology with labs that work on environmental management), and physical and chemical applications (in developing new SAFE nuclear technology through the NAPC.

For nuclear power, changes have also been made to the plants themselves. The designs have been upgraded to include fire protection, piping systems, auxiliary feedwater systems, containment building isolation, reliability of individual components (pressure relief valves and electrical circuit breakers), and the ability of plants to shut down automatically. Similarly, a reevaluation of the role of plant staff has resulted in improved operating procedures and programs such as fitness-for-duty for plant workers and more vigorous monitoring of alcohol or drug abuse.

Changes have also been made concerning emergency preparedness. It is now required for plant operators to immediately notify nuclear regulation organizations during significant events. Drills and response plans are now tested several times a year, and in many countries, such as the US, state and local agencies participate in drills with the

Federal Emergency Management Agency. Regular analyzes and surveillances are also made.

After Fukushima, in September 2011, the IAEA publicized its Action Plan on Nuclear Safety comprised of 12 modes of action. The plan consisted of steps to promote continuous improvement and learning within the realm of nuclear safety in nuclear power plants. According to Denis Flory, Deputy Director General of the Department of Nuclear Safety and Security, member states have made progress in all twelve fields of action: safety vulnerabilities, peer reviews, EPR regulatory bodies, operating organizations, IAEA safety standards, legal framework, embarking countries, capacity building, protection of people and environment, communication, and research and development. Overall, improved methodology, greater attention to reviews and enhanced response signify the overall success of the plan and the IAEA's optimism for a safer future in nuclear technology.

Similarly, safety measures were refined and new approaches to nuclear safety were discussed in multiple international meetings in 2012. The March 2012 Nuclear Security Summit in Seoul, South Korea and the May 2012 Fourth Review Meeting of the Joint Convention in Vienna both convened to discuss national reports and ways to enhance safety in nuclear power. In September 2012, all member states convened in Vienna for the 56th annual IAEA General Conference. Over the course of five days, sixteen resolutions were constructed and adopted, tackling issues such as international cooperation, transparency, and effectiveness of the safeguards system.

Bloc Positions

The very differing reactions of different countries may well reflect the difficulty in assessing some of the costs of nuclear energy relative to its benefits: While the downside of a nuclear accident can be thought of as killing tens of thousands of people either instantly by explosion or over time through exposure to radiation, the possible risk of continued burning of hydrocarbons causes much less spectacular damage.

Still, the costs of climate change (e.g. deaths through storms, droughts etc) associated with fossil fuel may be as real as those associated with a possible nuclear incident just not as easily attributable. At the same time, the risks associated with a single incident are much greater in nuclear than in conventional energy. Thus sometimes the careful evaluation of costs and benefits is not simple.

The danger associated with nuclear power is a globally known fact, it is one of the major reasons why environmentally unfriendly hydrocarbons continue to dominate the world energy markets. Still, many countries have relied and continue to rely on nuclear energy, while, at the other hand, especially more recent concerns have caused amongst other nations, a counterforce.

• *United States of America:* The US currently uses the most nuclear energy worldwide, about 19% of its energy is derived from nuclear power plants.

• *France, Belgium, Slovakia:* The three countries who use nuclear power as their primary source of energy

• *China, Republic of Korea, and India:* All three countries have announced plans to pursue large-scale expansions of their plants.

• *Germany:* Announcing its opposition to nuclear power and its affects, Germany has decided to close all its nuclear power plants by 2022.

• *Switzerland:* Switzerland has abandoned plans to build new reactors and has also publicized that it will not restore its current 5 reactors once they terminate (by 2034).

<u>Questions to Consider:</u>

- To what extent should your country consider protecting its citizens from nuclear disaster, do you currently operate nuclear power plants or are you in close geographical proximity to a country that does?

- If your country does not have nuclear power and does not plan to harness it in the future, how does it view other nations who want to use it?
- Should safeguards and surveillance be enforced on countries currently using nuclear power?
- Considering the IAEA’s unique standing as the sole international protector of nuclear material, what can Member States do to ensure that the Agency caters to all countries’ expectations and needs concerning nuclear safety and protection?

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