Forum: Environment Commission

Issue: Mitigating the toxic pollutant crisis in Japanese waters

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Introduction

On March 11, 2011, an earthquake with a magnitude of 9.0 struck Japan, causing a catastrophic damage in the region. Soon, a tsunami was created by the earthquake causing additional damage. The earthquake centred 130 km offshore the eastern coast of Honshu Island, specifically, city of Sendai in Miyagi. The death toll as a result of the two natural disasters was about 19,500; however, the disaster did not end. As tsunami roared inland, Fukushima Daiichi ("Number One") nuclear power plant was damaged. This has been recorded as the second worst nuclear accident, after Chernobyl. Tokyo Electric and Power Company (TEPCO) had announced that the facility was structured to have six boiling water reactors. At the time of accident, 1-3 were operational, and the rest was served as temporary storage for used fuel rods. When the accident happened, three reactors that were operating were successfully shutdown; however, the backup generators were damaged by tsunami.

Even though all three reactors were successfully shut down, the fuel rods in every reactor's core suffered partial meltdown, which caused the radiation to spread. Nuclear material in the core partially exploded as the materials melted through the containment vessels. As people call butterfly effect, explosions – resulting from the pressurized hydrogen gas accumulated – happened in the outer containment buildings. Government and workers stabilized the reactors by pumping seawater and boric acid into them. Now, Japan is planning to release 1.25 million tons of wastewater, which were gathered in the process of cooling down the reactors, into Pacific Ocean.

Definition of Key Terms

Reactor

Reactor is the device that can both initiate and control nuclear fission.

Nuclear Fission

Nuclear Fission is a reaction when heavy nucleus becomes unstable due to bombard of neutrons. Nucleus of an atom continuously splits into two or more smaller nuclei as time passes.

Tritium

Which is radioactive isotope of hydrogen, tritium or hydrogen-3 is a rare element. It is made artificially by irradiating lithium metal in a nuclear reactor.

Background Information

There were total of two level 7 nuclear accidents: Chernobyl and Fukushima Daiichi nuclear disaster. Although Chernobyl has been recorded as worst nuclear accident, some scientists state that Fukushima may be worse. Fukushima nuclear disaster resulted in tons of wastewater and waste-soil. On April 13, 2021, the Japanese government announced that they decided to release wastewater to Pacific Ocean. However, the Japanese government claimed that they will be removing the harmful radioactive substance before releasing the wastewater. Clearing wastewater entirely safely will cost astronomical amounts of money; therefore, Japanese government chose the easier and cheaper way.

Fukushima Daiichi Nuclear Power Plant

Fukushima Daiichi (“Number One”) Nuclear Power Plant is a nuclear power plant located in the towns of Futaba and Okuma. Right now, it is decommissioned due to the accident.

Fukushima Daiichi Nuclear Disaster

An earthquake with a magnitude 9.0 struck eastern coast of Honshu Island following with a tsunami that damaged Fukushima Daiichi Nuclear Power Plant. Reactors 1 through 3, which were operating, were successfully shutdown, and rest of the reactors were damaged. Japanese government and Tokyo Electric and Power Company (TEPCO), the main operator of Fukushima Daiichi Nuclear Power Plant, decided to pour seawater and boric acid in the reactors to cool down reactors that were releasing radiation out to the atmosphere.

Disposal of wastewater of Fukushima Daiichi Nuclear Power Plant

The Japanese government poured seawater and boric acid into the reactors with the purpose of cooling them down. Seawater is, now, being stored in huge tanks, but the space is limited; therefore, Japan decided to release wastewater out to Pacific Ocean after removing radioactive materials, which are critical to maritime environment and human health, viz. only to follow nuclear safety standard.

Consequences of Fukushima Daiichi Nuclear Accident

The earthquake that struck Japan damaged a great number of buildings and infrastructures, and simultaneously, as tsunami, what earthquake caused, roared in, there were enormous amounts of deaths – more than 1,500 people were killed, over 6000 were injured, and there still are 2,500 people missing.

Rafael Mariano Grossi, the director of IAEA, stated that releasing wastewater to ocean happened elsewhere, so there is nothing new, it is safe. However, since it is a nuclear-related accident, it cannot be fully safe: tritium will be left despite Japan tries to remove radioactive materials. The plan of releasing is to slowly release wastewater until 2051 over the course of 30 years. Tritium being half-life of around 12 years, it will disappear from environment within the period of decades. Scientists said that there is no issue scientifically, but the fishing industry groups are concerned with the probability that tritium involving into the food chain where it will ultimately reach human body. Scientists stated that there is possibility of happening, but it will not pose a threat to human health.

Nuclear Safety Standard

Among the IAEA's safety standards, most important standard is Nuclear Safety Standard. All of the activities that involve radiation, such as operation of nuclear installations, should be under the standard because this standard is for the prevention of harmful consequences that can be happening in both human environment and maritime environment. This standard is kept at the lowest level where it will not affect the environment that much. The main goal of this regulation is: to keep the harmonized level of radiation of the World.

Reaction toward Japan's decision

Countries or Organization Supporting Japan's Decision

United States of America and International Atomic Energy Agency (IAEA), mainly, did not object to Japan's decision on Fukushima wastewater. Other countries that are depending on trading with Japan, of course, did not oppose. United States' assertion was that Japan is not exceeding nuclear safety standard.

Countries or Organization Opposing Japan's Decision

Many countries are opposing to Japan's decision. Mainly, the Republic of Korea, People's Republic of China, Russian Federation, etc. Those countries are worrying about citizen's health and maritime environment.

Caption #1: Environmental activists in South Korea protesting the Fukushima wastewater plan

Scientists' response toward Japan's Decision

Scientists who are studying professionally about nuclear physics stated that if Japan removes critical radioactive elements, that will be under the nuclear safety standard, it is likely to be safe to release tons of wastewater into Pacific Ocean. On one hand scientists stated that releasing wastewater will likely be safe, scientists have no idea for this since this is the first case someone, or any country, is releasing wastewater into ocean. Thus, as a means of trial or future cases, scientists decided to observe what will happen worldwide.

Possible Consequences of Japan's Decision

As Japan is releasing the "treated" wastewater into Pacific Ocean, scientists and countries are both hopeful and worried. Currently, scientists and IAEA asserted that the "treated" wastewater's radiation will be very low.

Countries' contention about Fukushima wastewater

First, countries that are opposing to Japan's decision are stating that the wastewater, even though it is well-treated, can be harmful to maritime animals and human consumers. By stating that releasing colossal amounts of wastewater is first time in the history, objecting countries are trying to cease Japan's plan. On the other hand, countries that are not objecting to Japan's decision are trying to emphasize that Japan is following nuclear safety standard.

Scientists' contention about Fukushima wastewater

Currently, TEPCO stated that the treatment will remove all the radionuclides, for instance: caesium and strontium; however, only tritium will be remaining un-cleared.

Vives I Batlle, a scientist at the Belgian Nuclear Research Centre in Mol – who studies the effect of radiation on marine ecosystem – stated, “You can discharge it (tritium) in quantity more than other radionuclides, because it has a very low impact.” Also, Deborah Oughton, a nuclear chemist and director of the Centre for Environmental Radioactivity at the Norwegian University of Life Sciences in Oslo, said, “Tritium is a naturally occurring radionuclide that can be found in the environment and in living organisms, including humans.” Moreover, Oughton said that over two to three years, radiation level will be within what’s allowed in drinking water.

Accordingly, based on what two scientists asserted, scientists believe that “treated” wastewater will possibly be safe to release into the Pacific Ocean. To sum up, scientists believe that treated wastewater will be capable for marine environment.

However, there are few scientists saying that Fukushima nuclear accident is more disastrous than Chernobyl. Fukushima nuclear accident’s impact on water, in particular, is worse than Chernobyl’s, stated by few scientists. Those scientists who asserted that Fukushima’s impact on water is worse than Chernobyl’s stated, at last, “treated” wastewater can be harmful to marine ecosystem and human consumers.

In conclusion, amongst scientists, opinions are not unified. Scientists are looking forward to the result.

Major Countries and Organizations Involved

Tokyo Electric and Power Company (TEPCO)

Tokyo Electric and Power Company, simply, TEPCO, is the Fukushima Daiichi (“Number One”) nuclear plant’s main operator. TEPCO announced that the wastewater was kept in huge tanks, though; as the time passed, the space is running out – the tanks are expected to fill up by 2022.

According to what TEPCO announced, currently, there is about 1.3 million tons of radioactive water, or wastewater, which is enough to fill 500 Olympic-sized swimming pools. TEPCO, also, has announced that they will get rid of critical radioactive elements, which remaining with tritium, from radioactive water and slowly release until 2051 which will take 30 years.

International Atomic Energy Agency (IAEA)

International Atomic Energy Agency, IAEA, stated that Fukushima Daiichi nuclear accident should pave the way for any nuclear accident happening in the future. Since the amount of wastewater and waste soil is tremendous, IAEA asserted that Fukushima accident will be a unique and complex

case that will help future accidents. Therefore, IAEA have not yet stated its exact side – supporting or opposing – to this case.

Japan

Japan is the country where the accident happened and planning to release the "treated" wastewater to Pacific Ocean due to lack of space. Japan's plan turned out to safe since there was the approval of IAEA and the scientists.

Republic of Korea (ROK)

Republic of Korea or South Korea is one of the countries that expressed strong opposition to Japan's decision.

According to aa.com, "The government expresses strong regret over the Japanese government's decision to release contaminated water from the Fukushima nuclear plant into the ocean," said Koo Yoon-cheol, the head of South Korea's Office for Government Policy Coordination (Khaliq, 14 April 2021).

The South Korean government stated they will take every necessary step to make their citizens and maritime environment safe from the radioactive wastewater.

United States of America (USA)

United States of America, unexpectedly, is one of the countries not opposing, but not exactly supporting, Japan's decision. The reasons were that Japan have adopted an approach based on globally accepted nuclear safety standards. USA has approved Japan to release the wastewater if they do not exceed nuclear safety standards.

People's Republic of China

People's Republic of China or, simply, China, similar with South Korea, is one of the countries that opposed strongly to Japanese releasing Fukushima wastewater to the Pacific Ocean. China believes Fukushima Daiichi nuclear accident is the most serious accident in the world. China's main assertion was that if Japan releases the wastewater to Pacific Ocean, the countries that has direct connection with Pacific Ocean will be critically damaged – including public health, public safety, and maritime environment.

Lastly, China wanted Japan to face the incident with full responsibility, fulfilling international obligations, whilst following the scientific regulations.

Timeline of Events

Date	Description of event
March 11st, 2011	A magnitude of 9.0 earthquake struck the coast of Honshu, Japan. Soon, enormous tsunami struck Fukushima Daiichi nuclear plant. Japanese pumped in ocean water to cool reactors 1, 2, and 3.
March 12nd, 2011	Pressure of containment vessel of Fukushima Daiichi reactor 1 reached 840 kPa, which was abnormal compared to normal levels of 400 kPa. TEPCO prepared to relieve pressure for reactors 2 and 3.
March 14th, 2011	Crew of 50 workers continually poured in seawater and boron into the reactor vessel.
March 16th, 2011	Fukushima Daiichi reactor 5 which was seemed to safely shutdown was found out to be dripping.
March 18th, 2011	Japanese officials allowed, for the first time, to bury damaged nuclear power plants under sand and concrete.
March 30th, 2011	Officials, for the first time, publicly acknowledged reactors 1 to 4 are permanently scrapped, and they are unable to reuse. However, they cannot abandon yet.
April 13th, 2021	Japan decides to release wastewater to Pacific Ocean.

Relevant UN Treaties and Events

- The EU's Promotion of the Highest Levels of Nuclear Safety – The Revised Nucle, 11 May 2015, **(NPT/CONF.2015/WP.56)**
- Friday, 23 October, 2015 15:00, 23 October 2015, **(A/C.4/70/SR.12)**
- Promoting and Protection of All Human Rights, Civil, Political, Economic, Social and Cultural Rights, Including the Right to Development: Written Statement / Submitted by the Human Rights Now, 8 June 2015, **(A/HRC/29/NGO/78)**

Previous Attempts to solve the Issue

Since it was an accident occurred in Japan due to natural disasters, the Japanese government and TEPCO tried their best to solve the issue. Also, since it is a nuclear-related accident, the Japanese government and TEPCO are trying their best to stop radiation.

Japan and Tokyo Electric and Power Company (TEPCO)

Japan, right now, is storing every wastewater in the barrels. Japan tried to clean the wastewater; however, tritium cannot be treated. There is no solution available to this issue, but at least not to

aggravate the issue, Japan and TEPCO constructed a fabric cover to protect the building from heavy rainfall and storms. Also, automatic cooling system was built 3 months after the accident.

Possible Solutions

Other Countries' Sacrifice

Japan is trying to release the wastewater to Pacific Ocean because there is no more space left in Japan, and, also, Japan does not want to spend exorbitant amount of money; therefore, if other countries are willing to share or lend their unusable land to Japan, the maritime environment and human health will remain safe.

Building a Structure on the Water or under the Water to Store Barrels of Wastewater

Since Japan encountered the problem named, "lack of space", Japan can build a structure on the water or under the water to store wastewater. However, Japan also does not want to spend exorbitant amounts of money, hence Japan can start a campaign worldwide to collect money for this plan.

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Appendix or Appendices

I. Further Reading:

- Summary & Facts of Fukushima Accident: https://www.britannica.com/event/Fukushima-accident
- International Atomic Energy Agency (IAEA) for Information: https://www.iaea.org/publications/10962/the-fukushima-daiichi-accident
- Fukushima Accident Report by IAEA: https://www-pub.iaea.org/mtcd/publications/pdf/pub1710-reportbythedg-web.pdf
- Final Report by TEPCO: https://www.cas.go.jp/jp/seisaku/icanps/eng/final-report.html

- Report by Nuclear Energy Agency (NEA): https://www.oecd-nea.org/jcms/pl_56777/ten-years-after-the-fukushima-daiichi-accident