Fukushima water issues

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Why is in news? Why is Japan releasing Fukushima water — and is it safe?

Japan started to pump treated radioactive water from the Fukushima Daiichi nuclear power plant, destroyed in a 2011 earthquake and tsunami, into the Pacific Ocean.

In response, China announced it is suspending Japanese seafood imports with immediate effect. South Korea's largest opposition party has amped up protests.

Reason for the release:

Several reactors at the nuclear power plant melted down after the 2011 earthquake and tsunami.

Since then, workers at the **now-defunct plant have been cooling the reactors** by using water, which becomes contaminated.

Storage Constraints: The Fukushima facility's **storage tanks are at full capacity** due to the need for constant cooling of damaged reactors since the 2011 tsunami disaster.

Vast Water Volume: The plant **requires 170 tons of cooling water daily, with rain and groundwater further exacerbating the issue**. The site holds 1,343 million cubic meters of water across 1,046 storage tanks.

Release Process: Filtered water undergoes a one-kilometre tunnel before entering the Pacific Ocean. This process is expected to span 30 years while the radioactive waste remains on land.

Concerns of Releasing Water:

There is **no known threshold below which radiation can be considered safe**, therefore any discharge of radioactive materials will **increase the risk of cancer and other known health impacts** to those who are exposed.

Water released can be **poisonous to the fish** and anyone who happens to live in the vicinity of the discharge point can be caught precarious.

Tokyo Electric Power Company (TEPCO) **hasn't removed tritium from the water** because this is **very difficult to do**.

Tritium is "**easily absorbed by the bodies of living creatures**" and "rapidly distributed via blood.

There were **other radionuclides** in the water that TEPCO's treatment procedure **couldn't entirely remove**.

These include **isotopes of ruthenium and plutonium**, which could **persist for longer in the bodies of marine creatures** and on the seafloor.

Countries such as China, South Korea, and Taiwan have expressed their concerns, and a representative of the Pacific Islands Forum, a bloc of Oceania countries including Australia, has called the release "simply

inconceivable” based on their experience with nuclear contamination.

Researchers have also called for more studies to be conducted to understand the potential long-term effects on the Pacific Ocean and its ecosystem.

Japan’s Other Options:

Some have asked why the Japanese government **cannot store the water for longer** and then discharge it.

This is **because the half-life of tritium is 12-13 years**, and the quantity of other radioactive isotopes in the water will also decrease over time.

The Japanese government has **declared the land around the Fukushima plant to be uninhabitable**, but there are **tanks available that could hold the water** until it is less radioactive.

However, in 2020, authorities decided that flushing the water into the ocean was the way forward, over storage and vaporization.

Fukushima nuclear disaster:

March 11, 2011: A **magnitude 9.0 earthquake and tsunami** struck Fukushima Daiichi Nuclear Power Plant.

Cooling systems failed due to the tsunami, causing reactors to overheat.

Hydrogen explosions resulted from chemical reactions between overheated fuel rods and water.

Escalating reactor damage led to the release of radioactive isotopes like iodine-131 and cesium-137.

Evacuations were ordered, and a 20-kilometer exclusion zone was established to limit radiation exposure.

Tritium:

Radioactive hydrogen isotope, 2 neutrons + 1 proton.

Emits low-energy beta particles in decay.

Uses: nuclear weapons boosting, fusion research, glow-in-the-dark devices.

Weak external risk, ingestion/inhalation concerns for internal exposure.

Naturally occurring, regulated due to potential impact.

Other Major Nuclear Disasters of the World:

Chernobyl Disaster (1986):

One of the most well-known and severe nuclear disasters, the Chernobyl disaster took place in Chernobyl Nuclear Power Plant in Ukraine.

A sudden power surge during a safety test led to a series of explosions and fires that destroyed the reactor core and released large amounts of radioactive material into the atmosphere.

Three Mile Island Accident (1979):

This accident occurred in the United States at the Three Mile Island Nuclear Generating Station in Pennsylvania.

A partial meltdown of the reactor's core resulted in the release of radioactive gases.

Kyshtym Disaster (1957):

It took place at the Mayak Production Association in the Soviet Union (now Russia).

It involved a nuclear waste storage tank explosion, releasing a significant amount of radioactive materials into the environment.