Fukushima nuclear water release

Why in news?

Twelve years after the Fukushima nuclear meltdown, Japan is releasing cooling water from the power plant into the ocean.

Why is the water being released into the Pacific Ocean?

- **Tsunami,2011-** Japan has had to cool the reactors at the nuclear power plant since they were destroyed during a catastrophic tsunami in 2011.
- It takes 170 tons of cooling water per day to keep them cool.
- **Full storage-** Storage tanks holding the cooling water at the ruined facility are full.
- **Additional water-** Rain and groundwater have been seeping into the site.

What is the procedure to filter the cooling water?

- **Filtered water-** Once the water has been filtered, it is considered safe and sent through a 1 km long tunnel before being released into the Pacific Ocean.
- This process will take an estimated 30 years to complete.
- The radioactive waste will remain on land.
- **Filter system-** The contaminated cooling water and groundwater will be sent through a filter system called the Advanced Liquid Processing System (ALPS).
- It can filter 62 different radionuclides and radioactive elements but it cannot filter out the radioactive isotope tritium.

> *Tritium is the isotope of hydrogen with atomic weight of approximately three with its nucleus consisting of one proton and two neutrons, has triple the mass of the nucleus of ordinary hydrogen.*

- **Reduce tritium concentration-** Japan wants to dilute the water until the concentration of tritium is reduced to about 1,500 Becquerel per litre.

> *A Becquerel (Bq) is a unit that measures the rate at which radioactive material emits radiation or how many atoms in the material decay in a given time.*

- Japan says that if the levels of tritium remain too high after filtration, they will repeat the process before releasing the water.

Why Japan's move is not welcomed by all?

- **Radiation level-** Environmental and fishing experts, neighbouring states, have accused Japan of downplaying the level of radiation in the cooling water.
- **Greenpeace-** The environmental group accused Japan that the contaminated water contains many radionuclides including strontium-90.
- **Environmental damage**- It causes a potential environmental damage as it impacts far-reaching ocean contamination
- **Loss of revenue-** It will lead to loss of reputation in the fishing industry and hence there would be a fall in fishing revenue.
- **Technology hurdle**- ALPS is not designed to filter out radioactive element carbon-14.
- **Long standing**- Cesium-137 has a half-life of 30 years, and carbon-14, more than 5,700 years.
- Hence, it has the potential to create long standing damage.
- It increase the risk of cancers, damage to cells, to the central nervous system and other health problems.
- **Radioactive hydrogen**- If released into the air, it is harder to control.
- The wind could carry the radioactive cloud to faraway places.
- **Bio magnification**- Tuna and other large ocean fish contain enough mercury from land-based sources to require people, to limit their consumption.
- Tuna have also been found to transport radionuclides from Fukushima across the Pacific to California.
- **Phytoplankton-** It can capture and accumulate a variety of radioactive elements found in the Fukushima cooling water, including tritium and carbon-14.
- When they are eaten, the contaminants would not be broken down, but stay in the cells of organisms, accumulating in a variety of invertebrates, fish, marine mammals and humans.
- **Marine sediments** - It can also act as a repository for radionuclides, and provide a means of transfer to bottom-feeding organisms
- **Irreversible**-Releasing radioactive contaminated water into the Pacific is an irreversible action with transboundary and transgenerational implications.
- The Oceans' capacity to receive limitless quantities of pollutants without detrimental effects is demonstrably false.

What are the alternative options available?

- **Install storage tanks**- Japan has chosen the fastest and cheapest solution, instead it should install more storage tanks, but there is a high risk of earthquakes in the region.
- **Evaporation-** Heat the tritium contaminated cooling water and let it to evaporate.
- **Reduce groundwater flow**
    1. Large amounts of concrete will be needed to expand the seawall,
    2. Stabilise large amounts of contaminated soil and
    3. Fortify the ice barrier presently in place to reduce groundwater flow into the damaged reactors.

Whether Japan allowed to release filtered cooling water into the sea?

- **Approval-** Japan's atomic agency and the International Atomic Energy Agency (IAEA)

have approved the plan.
- **IAEA**- It said Japan had met international safety standards and that discharges of the treated water would have a negligible radiological impact to people and the environment.
- It had been common practice for nuclear power plants worldwide to release used cooling water into the ocean for decades routinely.

What lies ahead?

- The apparent rush to treat, dilute and dump should be postponed until further due diligence can be performed, and alternative approaches seriously considered.
- A more detailed set of analyses that includes problematic scenarios can help prevent another calamity.

Quick facts

International Atomic Energy Agency
• **Established-** In 1957 as United Nation's autonomous organization. • **Headquarters**- Vienna, Austria. • **Role-**It is an intergovernmental organization that seeks to promote the peaceful use of nuclear energy and to inhibit its use for any military purpose, including nuclear weapons. • **Membership-** 177 member states. • **India-** It is a member of this organization. • **Missions-** 1. *Peaceful uses*- Promoting the peaceful uses of nuclear energy by its member states, 2. *Safeguards*- Implementing safeguards to verify that nuclear energy is not used for military purposes, and 3. *Nuclear safety*- Promoting high standards for nuclear safety. • **Nobel peace prize**- It was awarded in 2005 for their work for a safer and more peaceful world.

References

1. Indian Express- Nuclear water release in Fukushima
2. Down to Earth- Alternatives to dumping nuclear wastewater

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