

Stemming the tide 2020

The reality of the Fukushima radioactive water crisis

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EXECUTIVE SUMMARY

Two years after our first report on the crisis,¹ more than a million tons of radioactive water is still sitting in tanks at the Fukushima Daiichi nuclear power plant in Japan, site of the catastrophic meltdown in March 2011. The Japanese government has decided that it will discharge the contaminated water into the Pacific Ocean, releasing strontium-90, carbon-14 and other hazardous radionuclides. It is a move that will have serious, long-term consequences for communities and the environment, locally and much further afield. Currently, discharges are planned to begin in late 2022 or early 2023, and these will continue until the mid-2050s.

The Japanese government and the Tokyo Electric Power Company (TEPCO) have constructed a series of myths to support their plan: that by 2022, there will be no further space for storage of the water; the water is not contaminated – radioactive tritium is the only radionuclide in the water and it is harmless; and there are no alternatives to discharging the water into the ocean.

This report, as did our 2019 analysis, demonstrates that these statements are untrue. The Japanese government's narrative has been created for both financial and political reasons. Not only is ocean discharge the cheapest option, it helps the government create the impression that substantial progress is being made in the early decommissioning of the Fukushima Daiichi reactors. But long after the Suga and Abe administrations are historical footnotes, the consequences of the nuclear disaster will remain a constant threat, most immediately to the people and environment of Fukushima, but also more widely in Japan and internationally.

Any government or industry confronted by the scale and range of challenges would have struggled to manage the disaster. However, time after time, TEPCO and Japanese government bodies appear to have conspired to make the crisis worse. TEPCO's recent admission that their processing technology is flawed, and the acknowledgement, almost 10 years after the disaster, that the water contains radioactive carbon-14 are just the latest in a long history of misreporting and cover-ups.²

There has been sustained opposition to the discharge of the contaminated water from citizens in Fukushima, commercial bodies such as Japan's national federation of fisheries cooperatives, JF Zengyoren,³ the majority of municipal assemblies in Fukushima Prefecture, and wider Japanese society. There has also been opposition from Japan's nearest geographical neighbours, especially the Republic of Korea. However, the Japanese government continues to ignore the views of all who seek to protect the world's oceans.

After a detailed examination of the evidence, Greenpeace has concluded that the only acceptable solution is continued long-term storage and processing of the contaminated water. This is logistically possible, and it will allow time for more efficient processing technology to be deployed as well as allowing the threat from radioactive tritium to diminish naturally. It is the only way to safeguard the human rights, health and environment of the people of Fukushima, the rest of Japan and the wider international community.

Main findings

Contaminated groundwater continues to accumulate

- * While the volume of groundwater flowing from the mountains and flood plains of Fukushima into the site has been reduced, the average daily rate in 2019 was 180 cubic meters (m³). This increases dramatically following typhoons – Typhoon Hagibis in October 2019 led to over 650m³ entering per day. The total amount of contaminated water is expected to rise to 1.37 million m³ by the end of 2020.
- * The primary source of radioactivity remains the melted nuclear fuel or corium located at the three Fukushima Daiichi reactors. Fresh groundwater entering the site continues to become contaminated as a result. It's estimated that this will lead to an additional 500,000 tons, perhaps as much as one million tons, of contaminated water accumulating by 2030.⁴

The Advanced Liquid Processing System (ALPS) is flawed

- * In terms of ALPS performance, and following the research by consulting engineer, the late John Large,⁵ we explain how TEPCO rejected using ion exchange technology from U.S. supplier Purolite despite its technology showing in 2011 that it could reduce concentrations of radionuclides in the contaminated water to Non-Detectable levels.
- * The resultant poor performance of the ALPS, operated by Toshiba and Hitachi General Nuclear Electric (HGNE), both of which had practically no experience in water processing, is likely to have its root cause in the decision to exclude Purolite.
- * Due to the failure of ALPS, 72% of the water currently in storage tanks is required to be processed again. There remain serious questions over how effective this will be. A test program in October 2020 is to be followed by the processing of more than 800,000 tons of contaminated water.⁶

The dangers of carbon-14 and tritium in the water are being ignored.

- * In addition to high levels of hazardous radionuclides such as strontium-90, TEPCO on 27 August 2020, acknowledged for the first time the presence of high levels of carbon-14 in the contaminated tank water.
- * ALPS was not designed to remove carbon-14 despite it being a long term radiological hazard. Carbon-14 is integrated in the carbon cycle, which is very complex due to the presence of inorganic and organic carbon, in solid, liquid or gaseous forms. Put simply, carbon-14 is incorporated into all living matter to varying factors of concentration. Claims by the Japanese government that the Fukushima Daiichi ALPS tank water is not contaminated water are clearly wrong.
- * If the contaminated water is discharged to the Pacific Ocean, all of the carbon 14 will be released to the environment. With a half-life of 5,730 years, carbon-14 is a major contributor to global human collective dose; once introduced into the environment carbon-14 will be delivered to local, regional and global populations for many generations.⁷
- * TEPCO and the Japanese government have so far failed to explain to the citizens of Fukushima, wider Japan and internationally that the contaminated water to be released into the Pacific Ocean contains dangerous levels of carbon-14.
- * The Japanese Ministry of Foreign Affairs (MOFA) has continued to mislead the United Nations human rights Special Rapporteurs when questioned over the Fukushima Daiichi contaminated water. For example, MOFA's statement in June 2020 that, "After most of the radionuclides except tritium

are removed in this purification system (ALPS), the water is safely stored in the tanks as ALPS treated water...Therefore ALPS treated water stored in the tanks is not contaminated water.⁸

- * Contrary to the understanding of the Japanese government, water that contains large quantities of radioactive carbon-14 (as well as the other radioactive isotopes including strontium-90 and tritium) can only be described as contaminated.
- * TEPCO continues to misrepresent and selectively ignore basic science facts on radioactive tritium. In particular, they continue to ignore and fail to explain the role of Organically Bound Tritium (OBT), and consequently are not providing accurate scientific data on the potential impacts of any future releases of contaminated water.
- * Current human dose models used by the IAEA (and the Japanese authorities and TEPCO) are based on single discharges, but when multiple discharges occur the levels of OBT build up gradually.⁹
- * There can be no justification for the failure of the Japanese government and TEPCO to fully explain the potential impacts of radioactive tritium discharges into the environment, including OBT.

Storage is a viable option

- * Our analysis of the Ministry of Economy, Trade and Industry (METI) Subcommittee on Contaminated Water report shows it understood that additional storage for the contaminated water beyond 2022 was possible both on and off the site, but ruled it out as it would take "a substantial amount of coordination and time".
- * The Subcommittee confirmed that longer storage of the ALPS-treated water would at least reduce the radiological hazard due to tritium. Tritium has a short half-life (12.3 years) and based on an annual discharge of 22TBq, METI's own data shows that delaying the start of discharges would allow the tritium to diminish naturally so that, if discharges began in 2035, they would be completed only three years later (2055) than if they were to begin in 2020.
- * The METI Subcommittee's recommendation to discharge the contaminated water into the environment was clearly not based on science and engineering, but on the political interest of the Japanese government and the future viability of TEPCO.

Local views and human rights issues are being ignored

- * There is strong local opposition to any discharge into the environment, including from municipal assemblies, fisheries associations, and citizens. The former UN Special Rapporteur on disposal of hazardous substances and wastes, Baskut Tuncak, stated: "It is their human right to an environment that allows for living a life in dignity, to enjoy their culture, and to not be exposed deliberately to additional radioactive contamination. Those rights should be fully respected and not be disregarded by the government in Tokyo."¹⁰

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Note on text content:

throughout this report we refer to Greenpeace. This refers to Greenpeace Japan and Greenpeace East Asia, unless otherwise stated.

Endnotes

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GREENPEACE

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