Fukushima Waste Water: "The ocean is not Japan's trash can"

By Robert Hunziker

By now, the world knows all about the decision by Japan to dump radioactive waste water into the Pacific Ocean beginning in two years. According to Japan's Deputy Prime Minister Taro Aso, the treated and diluted water will be "safe to drink." Mr. Aso claimed further that Japan should have started releasing it into the ocean earlier. ("China to Japan: If Treated Radioactive Water From Fukushima is Safe, 'Please Drink It,'" *Washington Post*, April 15, 2021)

In response, Chinese Foreign Minister Lijian Zhao said, "The ocean is not Japan's trash can."

Mr. Zhao may have stumbled upon the best solution to international concerns about Tepco's (Tokyo Electric Power Company) planned dumping of radioactive waste water into the Pacific. Instead, Tepco should remove it from the storage tanks at Fukushima Daiichi and deliver it to Japan's water reservoirs where, similar to the ocean, it will be further diluted, although not quite as much. After all, the International Atomic Energy Agency (IAEA) and the Japanese government are full of praise and confidence about how "harmless" the radioactive water will be. Let Japan drink it and/or use it for crop irrigation.

Japan has approximately 100,000 dams — roughly 3,000 of which are over 50 feet tall — for flood control, water supply, and hydroelectric power. Some are used exclusively for irrigation of crops. These reservoirs are more than adequate to handle Tepco's "harmless" radioactive waste water. In a straightforward approach, Japan should use water trucks to haul the Fukushima radioactive water to various dam reservoir locations throughout the country. The bigger the reservoir, the better it'll be for dumping and dilution purposes.

For example, one of the largest drinking water reservoirs in Japan is Ogouchi Reservoir, which holds 189 million tons of drinking water for Tokyo. Tepco is currently storing 1.3 million tons of the waste water at Fukushima Daiichi and nearing full capacity. The Ogouchi alone should be able to handle at least 1/4 and maybe up to 1/2 of the radioactive water without any serious consequences, especially as both the IAEA and the government of Japan have clearly given thumbs-up. No worries, it's safe.

The citizens of Tokyo should be okay with this plan since their own government and the IAEA and the United States have reassured the world that dumping Fukushima's radioactive water into a large body of water is safe — in fact, safe enough to drink. Voila! Problem solved!

With the blessing of the IAEA and the United States, via Biden's Climate Envoy John Kerry, Japan's government plans to start releasing radioactive water from Fukushima Daiichi's water storage tanks into the sea effective 2022, allegedly removing the toxic deadly isotopes like cesium-137, leaving behind less deadly toxic tritium. Why not dump that "harmless water" (according to Japan's own statements) into their water systems rather than into the sea? It doesn't make sense to dump drinkable water (according to Japan's Deputy Prime Minister) that simply needs a bit of dilution in a larger body of water, like the sea, when reservoirs are nearby to put it to good use and of adequate size to effectively dilute the toxic water, similar to the ocean.

Identical to all radioactive substances, tritium is a carcinogen (causes cancer), a mutagen (causes genetic mutation), and a teratogen (causes malformation of an embryo). The good news: tritium emits relatively weak beta radiation and does not have enough energy to penetrate human skin. The main health risks are ingesting or breathing the tritium-laced water in large quantities.

Cancer is the main risk for humans ingesting tritium. When tritium decays it emits a low-energy electron that escapes and slams into DNA, a ribosome, or some other biologically important molecule. Unlike other radionuclides, tritium is usually part of water, so it ends up in all parts of the body and therefore, it can promote any kind of cancer. ("Is Radioactive Hydrogen in Drinking Water a Cancer Threat?" *Scientific American*, Feb. 7, 2014)

Some evidence suggests beta particles emitted by tritium are more effective at causing cancer than high-energy radiation such as gamma rays. Low-energy electrons produce a greater impact because at the end of their atomic-scale trip, they deliver most of their ionizing energy in one relatively confined track, rather than shedding energy all along their path like a higher-energy particle. Of course, scientists say any amount of radiation exposure poses a health risk. (How Radiation Threatens Health, *Scientific American*, March 15, 2011)

"Tritium is very mobile and can enter biological systems and has the potential to damage living cells." (Kevin Bundy, et al, "Tritium, Health Effects and Dosimetry," *Encyclopedia of Sustainability Science and Technology,* 2012 edition)

"A Japanese official said it's okay if you drink this water. Then please drink it," Chinese Foreign Ministry spokesman Zhao Lijian said at a news briefing.

— Washington Post, April 14, 2021

"Tritium can potentially be hazardous to human health because it emits ionizing radiation, exposure to which may increase the probability that a person will develop cancer during his or her lifetime. For this reason, it is very important that human exposure to any radioactive material, such as tritium, is minimized within reason." (*Health Physics Society*, "Tritium," Fact Sheet, rev. January 2020)

Perhaps Tepco, the government of Japan, the United States, and the IAEA are counting on the hedged statement in the previous paragraph as their primary rationale for dumping radioactive waste into a larger body of water: It'll be "minimized within reason." Hmm.

In fact, as *The Hill* reports: "The storage tanks now hold seawater that has been used to continue cooling the reactor cores, and this water is contaminated with such radionuclides as cesium-137, carbon-14, tritium (including the more dangerous 'organically bound tritium'), strontium-90, cobalt-60, iodine-129, plutonium-239 — and over 50 other radionuclides. Some of this has reportedly been removed, but some has not (e.g. radioactive tritium and carbon-14). Tepco, which owns Fukushima and is now responsible for the cleanup (that is likely to last the remainder of this century), didn't admit until 2018 that the wastewater contains significant amounts of radioactive carbon-14. As carbon-14 has a half-life of 5,730 years, is known to bio-accumulate in marine ecosystems, and to cause cellular and genetic impairment, this is a very serious concern." (Rick Steiner, "The Danger of Japan Dumping Fukushima Wastewater into the Ocean," *The Hill*, April 17, 2021)

According to *The Hill,* Tepco's treatment system is subpar and likely not up to the task of thorough filtering.

Ken Buesseler, a marine chemist at Woods Hole Oceanographic Institution in Massachusetts, asks, "Would this open the door for any country to release radioactive waste to the ocean that is not part of normal operations?" ("Japan Plans to Release Fukushima's Wastewater into the Ocean," *Science,* April 12, 2021)

Reportedly, Japan's government did not consult its neighbors about the plan. China issued a warning, "The international community is watching," calling on Tokyo to "fulfill its international responsibilities to the environment." A harsh South Korean Foreign Ministry complaint said Japan will "directly and indirectly affect the safety of the people and the neighboring environment … difficult to accept … without sufficient consultation of neighbors." Meanwhile, local Japanese fishermen are fit to be tied because dumping radioactive water into the ocean is essentially a death sentence for their industry.

On the other hand, the IAEA is just fine with the scheme since it meets "global standards." The agency says it's normal for nuclear reactors around the world to release some amount of tritium into the seas. There is nothing positive about that, nothing whatsoever.

Tepco has invented a filtering program it named Advanced Liquid Processing System (ALPS) that purportedly "removes 62 isotopes from the water," all except tritium, which is radioactive hydrogen and cannot easily be filtered out of water.

Marine scientists and Greenpeace-Japan have repeatedly criticized the adequacy of the ALPS filter/removal process, noting that many highly toxic, deadly radioactive isotopes remained in the waste water. ("Treated water at Fukushima nuclear plant still radioactive," *Seattle Times*, Sept. 28, 2018)* Tepco has pledged to re-filter over 70% or 875,000 tonnes of its radioactive waste water.

It is highly unlikely that the international community, other than the United States, will ever be comfortable with Japan's decision to dump toxic radioactive water into the sea. Therefore, the country should take it upon itself to dispose of all radioactive water in their extensive network of water reservoirs.

Of course, nuclear power advocates argue that it's insane to dump the radioactive water into any body of water other than the ocean because its massive circulation capabilities will disperse the radioactive water throughout the world. But, that's precisely what other countries do not want!

Deliberately, Japan has made the problem a simple one to deal with by publicly admitting that the treated water will be harmless, good enough to drink. As follows, they can keep it. Enough said!

Postscript: "Japanese Deputy Prime Minister Taro Aso repeated his claim April 16 that it is safe to drink treated radioactive water accumulating at the crippled Fukushima Daiichi nuclear power plant after China asked him to personally prove it." ("Taro Aso Repeats Claim That Treated Fukushima Water is Good to Drink," *Jakarta Post*, April 16, 2021)

— Robert Hunziker of Los Angeles wrote this comment for CounterPunch, April 23, 2021

*Editor's note. Please see also: "Opening the floodgates at Fukushima," *Science*, Aug. 7, 2020 • "Mix of contaminants in Fukushima wastewater, risks of ocean dumping," *Science Daily*, Aug. 6, 2020 • "Fukushima nuclear plant owner apologizes for still-radioactive water," Reuters, Oct. 11, 2018 • "Treated water at Fukushima nuclear plant still radioactive: Tepco," *Japan Times*, Sept. 29, 2018 • "All options need to be weighed for Fukushima plant tainted water," *Asahi Shimbun*, Sept. 6, 2018 • "Residents blast water-discharge method at Fukushima plant," *The Asahi Shimbun*, Aug. 31, 2018

Cartoon by Mark Taylor for Nukewatch