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IN PERSPECTIVE

Reprocessing Will Increase Japan's Tritium Problem

Missing from Japan's debate over the planned ocean dumping of tritium-contaminated water from Fukushima, are plans to engage in commercial-scale reprocessing beginning in 2022. That will greatly increase the amounts of tritium Japan releases into the environment, argue Jungmin Kang, former chairman of South Korea's Nuclear Safety and Security Commission, and Hajime Matsukubo, of Japan's Citizens Nuclear Information Center.

A subcommittee of the Ministry of Economy, Trade and Industry (Meti), in its final report submitted to the Japanese government Feb. 10, recommends ocean release of tritium-contaminated radioactive water from the Tokyo Electric Power Co.'s (Tepeco) Fukushima Daiichi nuclear power plant. The water would be diluted to meet the release criterion in the law. Based on this, Meti, after hearing local opinions, would make a decision when to discharge the radioactive water to the ocean.

Currently, roughly 170 tons of water contaminated with radioactive tritium are produced at the Fukushima site every day. As of Oct. 31, 2019, approximately 1.17 million tons of the radioactive water were stored in about 1,000 tanks. And Tepco said the plant will likely run out of tank space on site by summer 2022. The reason for discharging contaminated water into the Pacific Ocean is that there is no remaining space on the Fukushima site to add tanks. The report considered off-site storage but dismissed it because it said the land in question is earmarked for interim storage of other wastes.

The radioactivity of the tritium in the tanks is approximately 900 trillion becquerels (Bq). In about 70% of the tanks, the concentration of other isotopes is above the legal release limit. The report recommends these tanks be filtered again before diluting.

Ibaraki prefecture, the neighboring Fukushima prefecture, has officially expressed its opposition to the dumping of the radioactive water. Fukushima's fishing industry also has expressed strong opposition because of the anticipated economic damage. And, according to the *Yomiuri Shimbun's* recent public opinion poll, more than half of Japan's voters are opposed.

In South Korea, domestic civil and environmental groups held a press conference on Feb. 14 and urged the Japanese government to withdraw its plan to dump Fukushima's radioactive water into the ocean. On Sep. 16, 2019, at the International Atomic Energy Agency (IAEA) general conference, the first vice minister of South Korea's Ministry of Science and ICT raised concerns over Japan's intention of dumping the radioactive water into the ocean.

Ironically, three decades ago, Japan's government found itself in a similar position when the Russian Navy began dumping hundreds of tons of low-level nuclear waste water into the East Sea (Sea of Japan) near Japan's northernmost island, Hokkaido. This led to a diplomatic dispute with Moscow. Russia insisted that the dumping posed no threat to the environment because the concentration of the radioactivity was below most of the IAEA limits. After protests from Japan and South Korea in late 1993, including public protests in front of the Russian Embassy in Tokyo, Russia agreed to stop the dumping.

What is missing in this debate is Japan's plan of larger-scale dumping of radioactive waste into the ocean and atmosphere starting in early 2022 when a commercial large-scale reprocessing plant located in Rokkashomura, Aomori prefecture, starts operating.

Reprocessing is the chemical process of separating plutonium, uranium and fission products from spent nuclear fuel discharged from reactors. Although it is not cost-effective, separated plutonium, about 1% of the heavy metal in spent fuel, can be used in mixed-oxide (Mox) fuel to feed reactors — and potentially also for producing nuclear weapons. The other radioactive components of the spent fuel are recovered and stored as high-level, medium-level and low-level radioactive wastes. During the reprocessing process, however, radioactive materials, including tritium, are released into the ocean and air.

Operating at its design capacity of 800 tons of spent fuel processed per year, the Rokkasho Reprocessing Plant would release annually approximately 9,700 trillion Bq of tritium into the ocean and approximately 1,000 trillion Bq of tritium into the air. Also annually released would be approximately 50 trillion Bq of carbon-14 and approximately 50 billion Bq of iodine-129 which, ironically, would dominate the hazard from radionuclides leaking from an underground repository of spent fuel directly disposed of without reprocessing, although one justification used for reprocessing is that it would minimize such hazard. Thus, the plant would annually discharge into the air more than the total

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tritium contained in Fukushima's radioactive water and ten times that amount into the ocean as well as huge quantities of other radioactive isotopes into both the air and ocean.

The Rokkasho Reprocessing Plant has been a global concern because it is capable of separating annually eight tons of plutonium from the reprocessing of 800 tons of spent fuel, enough for 1,000 nuclear weapons based on the IAEA's metric of weapon quantities of plutonium. If other countries follow Japan's example, there will be a great increase of the risks of nuclear terrorism and of nuclear proliferation.

As of the end of 2018, Japan had 45.7 tons of separated plutonium of which nine tons were in Japan and 36.7 tons in the UK and France. Completion of Japan's Mox plant that would utilize the separated plutonium from the Rokkasho reprocessing

plant is years away. And Japan has only four Mox-using reactors in operation that can consume about 2 tons of plutonium per year at this point. Operating the Rokkasho plant therefore would just increase Japan's stock of separated plutonium, violating Japan's own plutonium-reduction policy.

In short, Japan must cancel operation of the Rokkasho Reprocessing Plant because: it would increase risks of nuclear proliferation and nuclear terrorism; it would dump enormous amounts of radioactive wastes into the ocean and air; and it would increase the cost of generating nuclear electricity in Japan. If it is a violation of international environmental ethics to dump Fukushima's radioactive water, accumulated due to the accident, into the ocean, it would be a much greater violation to start unnecessary operation of the Rokkasho Reprocessing Plant, newly releasing much larger quantities of radioactive materials every year. ■