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Commentary: The IAEA Comprehensive Report does not provide a "scientific basis" for the oceanic release of ALPS-treated radioactive wastewater. The release plan should be halted and consideration given to the implementation of alternative proposals

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Summary Points:

● The IAEA Comprehensive Report lacks recognition of the serious implications of the discharge being from the melted-down nuclear reactors.

● The IAEA review does not guarantee the safety of actual oceanic releases.

● Oceanic releases are not consistent with the IAEA safety standards at least as regards 1) "justification of radioactive discharge to the environment" and 2) "broad consultation with interested parties".

● A complete revision of the Decommissioning Roadmap of the Fukushima Daiichi Nuclear Power Station (FDNPS) is necessary. A coercive oceanic release will hinder accident responses at the FDNPS and the ongoing recovery of the affected regions.

● Feasible alternatives to avoid oceanic release have already been proposed. The release plan should be stopped and the implementation of alternative proposals considered.

The International Atomic Energy Agency (IAEA) has issued a report[1] on the discharge of treated water from the Fukushima Daiichi Nuclear Power Station (FDNPS)'s Advanced Liquid Processing System (ALPS) into the ocean. Director General of IAEA, Dr Grossi, states in his foreword to the report that "the approach and activities to the discharge of ALPS treated water taken by Japan are consistent with relevant international safety standards." This is said to be an "endorsement" of the Japanese government's and the FDNPS's operator Tokyo Electric Power Company (TEPCO)'s plan[2].

As stated in the IAEA Comprehensive Report, the review, conducted in light of IAEA safety standards, was initiated at the request of the Japanese government after its decision[3] to conduct an "ocean

[1] IAEA Comprehensive Report on the Safety Review of the ALPS-treated water at the Fukushima Daiichi Nuclear Power Station. July 2023 (hereinafter abbreviated as "IAEA Comprehensive Report")
https://www.iaea.org/sites/default/files/iaea_comprehensive_alps_report.pdf

[2] https://www.bloomberg.co.jp/news/articles/2023-07-04/RX9J8GT0G1KW01

[3] The Inter-Ministerial Council for Contaminated Water, Treated Water and Decommissioning issues, " Basic Policy

discharge" in April 2021. This was to ensure that the Radiological Impact Assessment (RIA) report submitted by TEPCO and the review process by the Nuclear Regulation Authority (NRA) were consistent with IAEA safety standards.

The IAEA, however, did not conduct a comprehensive review of all items included in the IAEA safety standards. Furthermore, since the IAEA is an organization that promotes the use of nuclear energy, the IAEA safety standards focus on the safety of nuclear facilities, and the IAEA itself is not necessarily neutral in terms of environmental and human rights protections.[4] In fact, the IAEA did not evaluate options other than ocean discharges, nor did it assess possible long-term effects on marine ecosystems and fisheries. The IAEA's Comprehensive Report is based on the documents submitted by the Japanese government and TEPCO, solely on the premise that the Japanese government had already decided to release the radioactive water into the ocean, and merely confirms the decision to go ahead with the oceanic release. Thus, the IAEA Comprehensive Report does not prove the oceanic release itself "scientifically correct"[5].

1. Poor recognition and evaluation of the fact that the “contaminated water” to be treated comes from the melted-down nuclear reactors.

The water[6] discharged into the ocean is “treated radioactive wastewater” that was generated by direct contact with the nuclear fuel in the melted-down reactors. This water is essentially different from the water discharged from a conventional reactor (containing tritium), and it is inappropriate to make a simple comparison of the two[7]. An intentional discharge into the ocean of treated radioactive wastewater generated from a reactor that has been involved in an accident has never occurred before.

Nearly 70% of the water currently stored in tanks after ALPS treatment contains residual radionuclides other than tritium in excess of the overall regulatory concentration limit. The government and TEPCO are assuming that secondary treatment will remove these radionuclides to below the regulatory limit. However, it is doubtful whether this process can be carried out properly. The doubt is due to the following facts.

First, there is only a slight track record of secondary treatment with ALPS, and it is uncertain whether its decontamination performance can be maintained for a long time to come. The IAEA comprehensive report did not verify the performance of ALPS secondary treatment. Therefore, there is no realistic guarantee of the safety of the discharge.

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on handling of ALPS treated water at the Tokyo Electric Power Company Holdings’ Fukushima Daiichi Nuclear Power Station," April 13, 2021. https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/bp_alps.pdf

[4] https://www3.nhk.or.jp/news/html/20230710/k10014124091000.html

[5] https://www3.nhk.or.jp/news/html/20230707/k10014121881000.html

[6] The water in question falls under the category of “nuclear source material, nuclear fuel material, or substances contaminated by such material " as defined in Article 62 of the Reactor Regulation Act.

[7] This is not to say that effluent from conventional reactors is safe and free of problems. It is known that radionuclides are concentrated in the seabed sediment and benthic organisms in the surrounding waters, and it has been reported that the incidence of leukemia is statistically higher around nuclear facilities which have high tritium discharges. Ian Fairlie (2020) *The Hazards of Tritium*, https://www.ianfairlie.org/news/the-hazards-of-tritium/

Second, TEPCO has not clarified the total amount of radioactive substances that will ultimately be released. The company does not clarify the duration of the release, either. Even now, regarding the radiological impact assessment, TEPCO has indicated nothing more than measurement results for only three tank groups as source data[8] for the 64 radionuclides. In other words, the complete picture of what kind of water is about to be released has not been revealed.

Third, there is a valid concern that the operator may not disclose proper information about the water being released. In fact, it was only after media scoops in 2018 that it was revealed that radionuclides other than tritium greatly exceeding the regulatory limits remained in the ALPS treated water that was supposed to be only tritiated. Until the news exposure, TEPCO had submitted data to the government councils only for the period when radionuclides other than tritium fell below the regulatory concentration limits. This incorrect data was also used in explanations to the public and at public hearings.

Fourth, the IAEA safety review did not include an assessment of contingencies, and the optimistic "assumptions" of the government and TEPCO were accepted as they were. The ocean discharge with treatment of contaminated water from the melted-down reactors is the first attempt of its kind in the world, and safety assessments must be conducted on the assumption of contingencies such as issues with ALPS performance and problems during radionuclides measurement.

Fifth, the IAEA review does not assess the cumulative effects of the large amounts of radioactive substances that have been released since the Fukushima nuclear accident occurred in 2011. It is firstly necessary to clarify the effects of the past release of contaminated water and then to assess the cumulative effects of additional and intentional discharges. Even now, radioactive dust and water continue to leak from the FDNPS through various routes, and the onsite contamination around the reactors remains grave. The regulatory dose limit of 1 mSv/year at the site boundary has not been met. It is thought that additional and intentional releases of radioactive substances will further aggravate this illegal situation.

2. The IAEA review assumes "ocean discharge" as an only given choice, and does not sufficiently comply with IAEA's own safety standards.

The IAEA review is premised on the Japanese government's "ocean discharge" decision and does not evaluate options other than oceanic release, such as storage in large robust tanks or mortar solidification, which have often been raised as viable methods for handling the ALPS treated water.

The International Commission on Radiological Protection (ICRP) Fundamental Principles of Radiological Protection[9] and the IAEA Safety Standards, which are based[10] on the ICRP principles, require that if radioactive materials are to be released into the environment, the release must be "justified"

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[8] The type, amount, and physical and chemical form of radioactive materials released into the environment.

[9] ICRP (2007) "ICRP Publication 103: The 2007 Recommendations of the International Commission on Radiological Protection" https://www.icrp.org/publication.asp?id=ICRP%20Publication%20103

[10] The IAEA Safety Standards consist of Safety Fundamentals, General Safety Requirements (GSRs), Specific Safety Requirements (SSRs) for facilities and activities, and General Safety Guides (GSGs) and Specific Safety Guides (SSGs) for the specific implementation of these safety requirements.

by showing that the overall benefits of the action exceed the damage caused by the release[11]. This justification must take into account economic, social, and environmental factors beyond the scope of radiological protection.

In this regard, the government and TEPCO have repeatedly stated that "there is no other option" and "it is essential for decommissioning and reconstruction processes" without specifying who will benefit and what kind of damage will be caused by the ocean discharge and whether the benefits outweigh the damage. In other words, neither the Japanese government nor TEPCO have implemented the justification process, and thus the government's decision to go ahead with the oceanic release does not comply with IAEA safety standards. Furthermore, the IAEA itself admits that it did not evaluate the justification process because the request from the Japanese government was made after the decision to release the radioactive wastewater into the ocean. This indicates that the IAEA itself has failed to assess whether or not the basic principles of radiological protection are met. Therefore, the IAEA's conclusion that the offshore release plan complies with IAEA safety standards is seriously flawed.

As stated in the IAEA Comprehensive Report, "the issue of justification of the discharge of ALPS treated water is inherently linked with the overall justification of the decommissioning activities taking place at the FNDPS and thus is influenced by broader and more complex considerations"[12]. What is now required of the government and TEPCO is just such an "overall" justification.

3. The IAEA Comprehensive Report does not adequately reflect the actual circumstances in which local and other interested parties are consulted.

The IAEA Comprehensive Report concludes that the activities and approaches taken by the government and TEPCO regarding stakeholder involvement are "consistent with international safety standards" based on the fact that the relevant ministerial councils were open to the public and public hearings and other forums were conducted on the issue. However, this conclusion is false. The information

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[11] For justification, GSR Part 3 states, "Principle 4: Facilities and activities that give rise to radiation risks must yield an overall benefit." 2.11 of GSG-8 "Radiation Protection of the Public and the Environment", established on this basis, states that "For planned exposure situations, justification is the process of determining whether a practice is, overall, beneficial, i.e., whether the expected benefits to individuals and to society from introducing or continuing the practice outweigh the harm (including radiation detriment) resulting from the practice. The benefits apply to individuals and society as a whole, and include benefits to the environment. Radiation detriment may only be a small part of the total harm. Justification thus goes far beyond the scope of radiological protection, and also involves the consideration of economic, societal, and environmental factors." 2.12 also requires emergency situations to be justified. Furthermore, Chapter 4 of GSG-9 "Regulatory Control of Radioactive Discharges to the Environment" states that unjustified releases should not be permitted.
IAEA (2014) GSR Part 3 Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards https://www-pub.iaea.org/MTCD/Publications/PDF/Pub1578_web-57265295.pdf
IAEA (2018) GSG-8 Radiation Protection of the Public and the Environment https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1781_web.pdf
IAEA (2018) GSG-9 Regulatory Control of Radioactive Discharges to the Environment https://www-pub.iaea.org/MTCD/Publications/PDF/PUB1818_web. pdf

[12] IAEA Comprehensive Report, p. 19

providers to the IAEA review were limited to the Ministry of Economy, Trade, and Industry (METI), TEPCO, and the Nuclear Regulation Authority (NRA). As a consequence, the IAEA did not examine how the opinions and requests expressed by fishermen, local residents, the general public, and also neighboring countries were handled, nor the content of the discussions, nor the methods used to hold the discussions, nor the degree to which they were reflected in policy decisions. The result is that the IAEA Comprehensive Report contains no mention of these matters.

The IAEA Safety Standards require that interested parties should be broadly consulted. The interested parties specified in the IAEA Safety Standards include local producers, the public and environmental groups[13]. In addition, taking into account transboundary impacts, citizens of other countries and neighboring countries are also included as interested parties[14].

In practice, the government and TEPCO have rarely held substantive consultations with a wide range of stakeholders. At the public hearings held by METI (Secretariat of the Subcommittee on Handling ALPS treated water) in 2018 (held at three venues in Tomioka Town and Koriyama City of Fukushima Prefecture, and Tokyo on August 30-31, 2018) and also at other consultation meetings, the majority of the speakers were opposed or cautious about oceanic releases. The IAEA Comprehensive Report commends NRA for taking public comments[15]. However, that too remained a mere formality in which opinions were just heard, and objections, concerns and alternatives raised by the public were not considered. After the 2018 public hearings, the series of hearings conducted by the government prior to the decision to discharge the water into the ocean have only included representatives of the “relevant organizations” designated by the government. In addition, the attendees were mostly men, and the opinions of the other half of the population, women, were not reflected.

Since 2018, no government-sponsored public hearings or other meetings for the general public have been held[16]. The opinions of interested parties, as defined by the IAEA safety standards, have never been reflected in decision-making. What the government and TEPCO have been doing are solely public acceptance promotions as a measure against "reputational damage", into which large sums of taxpayers' money have been invested.

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[13] IAEA Comprehensive Report, p. 94

[14] IAEA Comprehensive Report, p. 95

[15] IAEA Comprehensive Report, p. 16

[16] Public hearings, public comments, and public opinion polls in newspapers and other media conducted during the process of studying contaminated water treatment also showed a majority opposed to the releases. For example, of the 44 speakers at the ALPS subcommittee hearings in three venues, only two agreed with the dumping of the water into the ocean (one of them with a conditional agreement), all the others voicing opposing views (https://cnic.jp/8163). At the "Forum for Hearing Your Opinions" sessions on the handling of ALPS treated water (April 6 and 13, 2020), the following statements were also made: "The direct impact of this ocean release is not reputational damage, but actual damage, which will continue until the disposal is completed" (Fukushima Prefecture Ryokan Hotel and Public Health Trade Association) and "As a fisherman in Fukushima Prefecture, I will continue to advocate our position that we are opposed to the oceanic release of treated tritium water. We would like to ask for your continued support" (Chairperson Satoshi Nozaki, Fukushima Prefectural Federation of Fisheries Cooperatives Associations). In addition, looking at the sorting out of the 4,011 responses to the official call (April to July 2020) for written submissions regarding the handling of ALPS treated water, it is estimated that most are opposed to the release of contaminated water with treatment. https://public-comment.e-gov.go.jp/servlet/Public?CLASSNAME=PCM1040&id=620220008&Mode=1

4. A thorough revision of the Fukushima Daiichi Nuclear Power Station's accident management and decommissioning process is needed.

On August 24, 2015, METI responded to the Fukushima Prefecture Fisheries Federation, saying, "We will take the necessary measures, including careful explanations to all parties concerned, including those in the fishing industry. No action will be taken without such processes and the understanding of those concerned[17]." TEPCO also responded to the federation on August 25 of the same year, stating, "No disposal will be conducted without the understanding of the parties concerned, and the ALPS treated water will be stored in tanks on the power plant site[18]."

Nevertheless, TEPCO, in its submission to the NRA in November 2022 of the "Application Documents for Approval to Amend the Implementation Plan for Fukushima Daiichi Nuclear Power Station Specified Nuclear Facility" (regarding the handling of ALPS treated water)"[19] altered this promise to "No discharge to the sea shall be made without the approval of the relevant ministries and agencies," and this was rubber-stamped by the NRA. This dishonest and opaque process of ignoring commitments made to stakeholders is completely overlooked in the IAEA Comprehensive Report.

In addition, the cost advantage that was presumed for the offshore release is no longer available. The Tritiated Water Task Force established under METI, which mainly conducted technical studies, evaluated ocean discharge as superior under the following assumptions[20]: discharge period of 91 months (treatment rate of 400 m^3/day), cost of 3.4 billion yen, and facility size of 400 m^2. However, the ALPS subcommittee, established later by METI, concluded that 22 trillion becquerels of tritium per year would be discharged (equivalent to 10 times the annual amount discharged from the FDNPS before the accident) and that the discharge period would be 20 to 30 years[21], which already differed from the assumptions reached by the Tritiated Water Task Force[22].

Since then, preparations have been made to actually release the water into the ocean. TEPCO has announced that it will cost about 43.7 billion yen over the three-year period from FY2021 to FY2024 alone for the construction of facilities to discharge water from the undersea tunnel and for radiological measurements[23]. Further, the Japanese government allocated 30 billion yen in a supplementary budget for FY2021 for "Measures for disposal of ALPS treated water" (including measures against reputational

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[17] http://www.abetomoko.jp/files/uploads/国から漁連への回答書__2.pdf

[18] https://www.tepco.co.jp/news/2015/images/150825a.pdf

[19] https://www.tepco.co.jp/en/hd/newsroom/press/archives/2022/20221114_01.html The altered wording appears in the original Japanese document III, Part 3, 2.1.2 "Management of radioactive liquid waste, etc." on page III-3-2-1-2-6 at https://www.nra.go.jp/disclosure/law_new/FAM/140000272.html - https://www.nra.go.jp/data/000410090.pdf

[20] https://www.meti.go.jp/earthquake/nuclear/osensuitaisaku/committtee/takakusyu/pdf/016_05_01.pdf

[21] https://www.meti.go.jp/earthquake/nuclear/osensuitaisaku/committtee/takakusyu/pdf/018_00_01.pdf

[22] The Task Force based its calculations on 800,000m^3 of stored water as of June 2016. Currently, it has increased significantly to 1,340,000m^3. The size of the facility is also expected to be much larger than 400m^2, judging from the construction status of the ALPS treated water dilution/discharge facility and related facilities. Further, the area over which contamination will spread due to the oceanic release is far larger than the alternative proposal by the Citizens' Commission on Nuclear Energy (mortar solidification plan), which would yield the smallest scale of contamination dispersal.

[23] https://www.tepco.co.jp/press/release/2022/hd11127_8712.html

damage)[24]. The cost of maintaining and managing the temporary tanks over the next 30 years will also be added. Ocean discharge is thus considered to have lost its cost advantage over other options.

The offshore discharge of radioactive wastewater takes as its premise the "Mid-and-Long-Term Roadmap towards the Decommissioning,"[25] which calls for decommissioning the plant in 30 to 40 years after the accident. As clearly shown by the fact that the nuclear fuel debris has scarcely been removed at all from the reactors 12 years on, and that it is still hard to predict how many years it will take to complete the removal, the current roadmap of 'decommissioning in 30 to 40 years' is utterly unrealistic.

The Citizens' Commission on Nuclear Energy (CCNE) has repeatedly pointed out the need to overhaul the Mid-and-Long-Term Roadmap and proposed realistic solutions that would not require release of contaminated water[26]. Ignoring the opinions of local residents and the general public and forcing the discharge of radioactive water into the ocean may instead hinder the viability of the decommissioning and socio-economic recovery. That would be to the detriment of the people of Fukushima Prefecture and all others concerned.

The government and TEPCO should rescind their decision to release the radioactive water to the ocean and start over with fundamental discussions, including a drastic review of the decommissioning schedule. An immediate step is to consider the already proposed alternatives that do not involve ocean discharge.

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[24] https://www.meti.go.jp/earthquake/nuclear/hairo_osensui/pdf/sesaku_2112.pdf

[25] Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4. https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html

[26] See Citizens' Commission on Nuclear Energy (2022), Our Path to a Nuclear-Free Japan, http://www.ccnejapan.com/20220826_CCNE202305.pdf Chapter 2 (especially, 2.3 and 2.4). In addition, according to METI's explanation, long-term storage in large tanks was rejected because it would go against the principle of completing decommissioning in 30 to 40 years and the area required for installation would be insufficient. Mortar solidification was also rejected because it would require evaporation prevention measures and new regulatory standards in addition to the difficulty of securing space (October 25, 2020, oral explanation by Mr. Okuda, Director of Nuclear Accident Response Office, Agency for Natural Resources and Energy, METI, October 25, 2020). These points have been discussed by the Working Group on Engineering and Nuclear Regulation of the CCNE, and we would like to request public discussion and third-party evaluation of these proposals.