

Major Points to be Clarified regarding Application of Facilities for Discharge of ALPS Treated Water into the Sea

December 24, 2021

The Secretariat of the Nuclear Regulation Authority

TEPCO Holdings Inc. applied the amendment of the Implementation Plan of the Fukushima Daiichi NPS Specified Nuclear Facility, specifically for the installation of the facilities for discharge of ALPS treated water into the sea (hereinafter referred to as "Discharge Facility") and the relevant safety operational measures, on December 21, 2021. The NRA indicates the following major points to be clarified in sufficient detail by the applicant at the coming Review Meetings. The NRA has currently identified those points and might raise additional points depending on the progress of future review and examination.

(1 Overall Policy)

- TEPCO should explain the importance of the discharge of ALPS treated water in the overall programme of decommissioning as well as the expected contribution of the Discharge Facility in reducing safety risks of the Specified Nuclear Facility as a whole.

(2-1 Major Points for the Examination based on the Reactor Regulation Act)

(1) Discharge Facility

- ① Control and Measurement of Mixing and Dilution Rate of ALPS Treated Water with Seawater
 - TEPCO should explain the methodology, including its validity, of mixing and dilution with seawater necessary for the tritium concentration control, in order to implement discharge in a manner to fulfill the regulatory requirement that the additional effective dose at the site boundary should be less than 1 mSv/year.
- ② Homogenization of Radioactivity of ALPS Treated Water in Tanks Prior to Discharge into the Sea
 - TEPCO should explain the method, including its validity, of homogenizing the radioactivity of ALPS treated water in the K4 area tanks prior to discharge into the sea.
- ③ Method of Seawater Intake and Discharging ALPS Treated Water after Dilution (including measures to prevent the transfer of radioactive materials in the harbor to the seawater intake)
 - Considering the way of dilution and evaluating the effective dose at the site boundary including the impact of discharge, the effect of radioactive materials that may exist at the seawater intake area should be considered, and if the effect is not negligible, TEPCO

should explain the measures to prevent the transfer of radioactive materials inside the harbor to the seawater intake area.

④ Detecting Unusual Situation and Method of Suspending Discharge of ALPS Treated Water into the Sea

- For the interlock mechanism, TEPCO should explain its expected role, logic circuit, and concept of various set limits.

⑤ Structure and Strength of Equipment, Design Consideration for Natural Hazards such as Earthquake and Tsunami, Prevention of Incorrect Operation, Reliability

- For each structure, system, and component that comprise the Discharge Facility, TEPCO should explain its safety function, the impact of the loss of safety function, basic specifications and the basic concepts thereof, the main construction, and the applied codes and standards.
- TEPCO should explain the measures against natural hazards such as earthquake and tsunami as well as external human-induced events, taking into account the potential radiological impact which the Discharge Facility may give rise to.

⑥ Validity Assessment of Facility Design upon Unusual Occurrences

- Assuming unusual occurrences including component failure and the unintended discharge of ALPS treated water as a consequence (hereinafter referred to as "unusual event"), TEPCO should explain equipment, human resources and procedures necessary for dealing with the said event and assess the amount of the unintended discharge provided that these measures are taken.
- In the assessment above, TEPCO should select the severest case from the viewpoint of the amount unintentionally discharged, and in the analysis, assume a single failure of the component that leads to the severest result.

(2) Measures for Operational Safety during Discharge into the Sea

① Method and Organizational Framework for Analyzing Radioactive Concentration of Nuclides in ALPS Treated Water

- TEPCO should explain the methodology for selecting nuclides that may affect the dose assessment, other than tritium (H-3), carbon 14 (C-14) and 62 nuclides to be removed by ALPS.

② Assessment of Effective Dose at Site Boundary due to Discharge of ALPS Treated Water into the Sea

(2-2 Major Points for the Review in Light of the Governmental Policy)

(1) Annual Discharge Amount of Tritium

- TEPCO should explain the method for operation and confirmation of discharge so that the amount of tritium discharged as ALPS treated water may not exceed the annual discharge control value of 22 trillion becquerels.

(2) Measures to be Taken in Response to the Results of Sea Area Monitoring

- TEPCO should explain the criteria and response procedures for suspending discharge when unusual values are identified in the sea area monitoring.

(3) Assessment of Radiological Impacts of Discharge into the Sea on the Surrounding Environment

- TEPCO should elaborate the basic concept that the assessment in the Radiological Impact Assessment Report is conducted with reference to the IAEA Safety Standards including the relevant Guides, and that the assessment results are sufficiently lower compared to the regional and life-style variation in annual natural radiation to humans in Japan
- With regard to the hypothetical source terms set based on the upper limits of discharge control, TEPCO should explain the basis for setting and the appropriateness thereof, including the selection flow of the operational control nuclides. TEPCO should also explain the assessment of potential changes in the annual discharge amount of tritium, taking into account the variations in the annual operation rate of the Discharge Facility.
- TEPCO should explain the rationale of applying the dispersion model to this evaluation, including the justification that this model could demonstrate typical dispersion in the ocean in the vicinity of the Fukushima Daiichi NPS, as well as the adequacy of the modeling range, which could be indicated by using radioactive concentrations at the model lateral boundaries.
- With regard to transfer model, TEPCO should explain the concept of selection, including the comprehensiveness and the reasoning of excluding some from the assessment.
- With regard to exposure pathways, TEPCO should explain the concept of selection, including its comprehensiveness and the reasoning of excluding some from the assessment.
- For the applied input values not from the reference documents such as the IAEA Guides, TEPCO should explain the basis and appropriateness thereof, taking into account the associated uncertainties in the assessment.
- With regard to the assessment of the impact of potential exposure, TEPCO should explain the concept of the assessment which does not follow the flow shown in Fig. 3 of GSG-10, including the basis for selection of the scenario.

- End -