

## **Regulatory compliance status with IAEA safety standards during the discharge of the ALPS treated water**

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### **Regulatory Control and Authorization 1**

#### **IAEA's review item**

- **NRA's approach to encourage optimization of protection and safety during future reviews of the authorization.**

#### **Related safety IAEA standards**

- GSR Part 3, 3.22 The government or the regulatory body: (a) Shall establish and enforce requirements for the optimization of protection and safety;
- GSR Part 3, 1.151.15 'The optimization of protection and safety, when applied to the exposure of workers and members of the public, .... is a process for ensuring that the likelihood and magnitude of exposures and the number of individuals exposed are as low as reasonably achievable, with economic, societal and environmental factors taken into account. This means that the level of protection would be the best possible under the prevailing circumstances. Optimization is a prospective and iterative process that requires both qualitative and quantitative judgements to be made.
- GSR Part 3, 3.119 'The government or the regulatory body shall establish and enforce requirements for the optimization of protection and safety for situations in which individuals are or could be subject to public exposure.'
- GSG-8, 3.33 'Optimization of protection and safety can be applied to the component parts of a particular practice and can be limited to consideration of the doses to particular groups of people. However, the boundary conditions for any analysis for the purposes of optimization should be carefully chosen since there may be consequences for other component parts of the practice or other groups of people. For instance, the costs and benefits of different effluent treatment options at a nuclear power plant should be considered in the optimization of protection of the public and protection of the environment against exposures due to radioactive discharges to the environment. Some of these options may have significant implications for the way solid wastes are stored at the

facility, or for the occupational exposure of workers, which also have to be considered in the optimization process.'

#### **From the comprehensive report**

- NRA noted that the Reactor Regulation Act states that if operational safety measures performed by TEPCO are not in compliance with the Implementation Plan, "NRA may order TEPCO to take measures necessary for operational safety, including suspension of discharge or alteration of the design on the Discharge Facility".
- the NRA highlighted the text from the "Specific Regulatory Requirements" that describes the requirement for optimization of protection from the overall site against the reference level of 1 mSv per year. The NRA also stated that the dose constraint of 0.05 mSv per year was set for discharges of ALPS treated water "with the recognition that optimization of protection is to be considered in the range below the dose constraint".
- the NRA confirmed it will continue to evaluate whether ALPS treated water discharges contribute to the progress of decommissioning. When revising 'Measures for Mid-term Risk Reduction for decommissioning TEPCO's Fukushima Daiichi NPS', NRA will require an explanation from TEPCO regarding optimization of protection based on their operational experience of the discharges.

#### **NRA's Updates**

- No update about the regulatory requirement
- NRA gets status report of ALPS operation from TEPCO at various meetings, including an open meeting with various stakeholders, including representatives from local area and academia. In these meetings, NRA oversight TEPCO's ALPS operation, including the optimization.

## Regulatory Control and Authorization 2

### IAEA's review item

- NRA's approach to reviewing and potentially revising discharge limits in response to TEPCO's ongoing optimisation of protection and safety.

### Related safety IAEA standards

- GSR Part 3, 3.32 'The safety assessment shall include, as appropriate, a systematic critical review of: a) The operational limits and conditions for the operation of the facility; (b) the ways in which structures, systems and components, including software, and procedures relating to protection and safety might fail, singly or in combination, or might otherwise give rise to exposures, and the consequences of such events; (c) The ways in which external factors could affect protection and safety; (d) The ways in which operating procedures relating to protection and safety might be erroneous, and the consequences of such errors.
- GSG-9 – para 5.10 'The authorization for discharges should be reviewed during the operation stage, for example as part of a periodic safety review of the facility or activity. Significant changes in any condition that could affect public exposure should be taken into account during the review of an existing authorization.'

### From the comprehensive report

- The NRA explained the process of periodic review to the Task Force. TEPCO is required to update the Implementation Plan whenever changes are proposed (including any changes to the source term, REIA, monitoring programmes, etc.), and that the NRA will then review the revised plan against the requirements in the Reactor Regulation Act and Government Policy for discharge of ALPS treated water. Once the revised Implementation Plan is approved by the NRA it will become legally binding.
- The NRA stated that periodic review of the authorization of discharge will be conducted within the process of optimization of protection related to the decommissioning activities for the whole site, typically once per year.

### NRA's Updates

- No updates about the regulatory requirement
- NRA gets status report of ALPS operation from TEPCO at various meetings, including an open meeting with various stakeholders, including

representatives from local area and academia. In these meetings, NRA oversight TEPCO's ALPS operation, including the optimization.

## Regulatory Control and Authorization 3

### IAEA's review item

- NRA's approach to identify "unusual values" and refine action limits based on incoming environmental monitoring data and other operational experience.

### Related safety IAEA standards

- GSG-9, para 5.79 For complex facilities, such as nuclear power plants or reprocessing facilities, monitoring programmes should also provide an additional means of checking the operating conditions of the facility and provide a warning of unusual or unforeseen conditions that might result in unexpected releases.

### From the comprehensive report

- NRA explained that the Implementation Plan describes TEPCO's response to "unusual occurrences", "unusual values" and "significant discrepancies".

### NRA's Updates

- No updates about the description
- NRA conducts operational safety inspection to oversight TEPCO's operation of ALPS. So far, NRA has not identified any safety concern about this TEPCO's plan.
- Also, as a part of the Implementation Plan, NRA approved that ALPS has functions for issuing alerts if some unusual issues, like leakages, were detected.

## **Safety Related Aspects of Systems and Processes for Controlling Discharges**

### **IAEA's review item**

- Identification and review of any abnormal occurrences and the subsequent actions taken by TEPCO and their interactions with NRA consistent with domestic regulatory requirements.

### **Related safety IAEA standards**

- GSG-9, para 5.93 The regulatory body should establish a process for identifying and managing any identified non-compliance with the regulatory requirements on discharges. When a regulatory requirement, including a condition of the authorization, has not been met, the operating organization should, as appropriate:(a) Investigate the breach and its causes, circumstances and consequences;(b) Take appropriate action to remedy the circumstances that led to the breach and to prevent a recurrence of similar breaches;(c) Promptly communicate to the regulatory body the causes of the breach and the corrective or preventive actions taken or to be taken;(d) Take whatever other actions are required by the regulatory body

### **From the comprehensive report**

- The NRA also provided an explanation of the operational inspection programme in place at FDNPS and the corresponding enforcement programme in place. At FDNPS, NRA maintains a contingent of about 10 resident inspectors and always have at least one inspector on-site, 24 hours a day. During visits to FDNPS, the Task Force observed that the NRA conducts routine operational inspections consistent with their mandate as an independent safety regulatory body and provided examples of the inspection documentation and enforcement manual to the Task Force for their review.

### **NRA's Updates**

- For the first year of the discharge, NRA oversighted operations of ALPS through the NRA inspectors and always had at least one inspector on-site, 24hours.
- From this April, because the operations of ALPS were conducted safely, NRA changed FDNPS's first respond shift. Now, NRA inspectors did not

stay in the site at night, but the NRA inspectors always stay enough close to the site and can go the site immediately even at night.

- NRA conducts operational safety inspection to oversight TEPCO's operation of ALPS including TEPCO's emergency response exercise. So far, NRA has not identified any safety concern, including abnormal occurrences of TEPCO's ALPS operation.

## Characterization of the Source

### IAEA's review item

- TEPCO's and NRA's review of the source term as 1) the decommissioning process at FDNPS continues and as the radionuclide content and other properties of contaminated water potentially change and 2) the operational ALPS technology at FDNPS potentially evolves.

### Related safety IAEA standards

- GSR Part 3, 3.131 'Registrants and licensees, in cooperation with suppliers, as appropriate: (e) Shall maintain an inventory of all radioactive waste that is generated, stored, transferred, or disposed of; (f) Shall develop and implement a strategy for radioactive waste management and shall include appropriate evidence that protection and safety is optimized.

### From the comprehensive report

- NRA provided evidence to the Task Force that, from their perspective, no significant radionuclides have been excluded from the current ALPS treated water source term. The evidence provided by the NRA included independent calculations of doses associated with the exposure pathways used to set the regulatory concentration limits and exposure pathways considered in the REIA and comparisons of the results of those two calculations. The Task Force discussed with NRA alternative characterization approaches that could be considered for determining the source term, if TEPCO makes further revisions in the future.

### NRA's Updates

- No updates about the description
- NRA acknowledged that TEPCO's addition of Cd113m to the measured and assessed nuclides has no safety impact for environmental assessment.



## **Radiological Environmental Impact Assessment**

### **IAEA's review item**

- Checking whether TEPCO and NRA have undertaken a periodic review of REIA.

### **Related safety IAEA standards**

- GSR Part 3 3.31 'Safety assessments shall be conducted at different stages, including the stages of siting, design, manufacture, construction, assembly, commissioning, operation, maintenance and decommissioning (or closure) of facilities or parts thereof, as appropriate, so as: (a) To identify the ways in which exposures could be incurred, account being taken of the effects of external events as well as of events directly involving the sources and associated equipment.'
- GSG-10, para 4.12, For facilities already in operation and activities being conducted, the safety assessment should be periodically reviewed and updated at predefined intervals, in accordance with regulatory requirements; this review should include the consideration of possible changes in the assumptions used to perform the radiological environmental impact assessment and the results of source monitoring and environmental monitoring programmes conducted during operation. The radiological environmental impact assessment may need to be revised if there are significant changes in the characteristics of the facility or activity or in the characteristics of the location.

### **From the comprehensive report**

- In February 2023, the revised version of the REIA was submitted to NRA as part of an amended Implementation Plan and was approved by the NRA in May 2023.
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### **NRA's Updates**

- NRA is going to review TEPCO's REIA if TEPCO updates it.

## Source and Environmental Monitoring

### IAEA's review item

- How future results from source and environmental monitoring published by TEPCO, and by independent organizations under the CRMP, are being used to verify and demonstrate compliance with the discharge authorization and requirements for the control of public exposures.
- Observation of the process utilized by the Government of Japan, NRA, and TEPCO to respond to any potential abnormal results from monitoring programmes.

### Related safety IAEA standards

- GSG-9, 5.92. The regulatory body should verify compliance with the regulatory requirements and the operational limits and conditions of the authorization for discharges. This should involve, as appropriate, auditing of the operating organization's records (including those setting out the results of discharge monitoring and environmental monitoring), review of the periodic reports on the results of the radiological environmental impact assessment review, of the results of the independent monitoring programmes, and inspection.
- GSG-9, para 5.93 The regulatory body should establish a process for identifying and managing any identified non-compliance with the regulatory requirements on discharges. When a regulatory requirement, including a condition of the authorization, has not been met, the operating organization should, as appropriate:(a) Investigate the breach and its causes, circumstances and consequences;(b) Take appropriate action to remedy the circumstances that led to the breach and to prevent a recurrence of similar breaches;(c) Promptly communicate to the regulatory body the causes of the breach and the corrective or preventive actions taken or to be taken;(d) Take whatever other actions are required by the regulatory body

### From the comprehensive report

- The NRA has undertaken a verification of TEPCO's source monitoring. It contracted a Technical Support Organization (TSO) laboratory (JAEA, Nuclear Safety Research Centre) to analyse a sample of ALPS treated water taken prior to the start of discharges for a subset of radionuclides:

tritium,  $^{14}\text{C}$ ,  $^{36}\text{Cl}$ ,  $^{55}\text{Fe}$ ,  $^{60}\text{Co}$ ,  $^{79}\text{Se}$ ,  $^{90}\text{Sr}$ ,  $^{99}\text{Tc}$ ,  $^{106}\text{Ru}$ ,  $^{125}\text{Sb}$ ,  $^{129}\text{I}$ ,  $^{134}\text{Cs}$ ,  $^{137}\text{Cs}$ . The sample was taken at the same time as those used for the IAEA's 1st ILC for corroboration of source monitoring [1]; TEPCO reported identical results for both exercises. For radionuclides for which activity concentrations above detection limits were reported by both TEPCO and JAEA, the results were compared against TEPCO's results using scores [22]. All such results (tritium,  $^{14}\text{C}$ ,  $^{60}\text{Co}$ ,  $^{90}\text{Sr}$ ,  $^{99}\text{Tc}$ ,  $^{129}\text{I}$ ,  $^{137}\text{Cs}$ ) were found to be in agreement, although JAEA were required to re-analyse the sample for  $^{14}\text{C}$ .

- Additionally, NRA requires that certain radionuclides are analysed for their presence in ALPS treated water (separate from the analytical comparison with TEPCO results) as an additional level of independent assessment. The analytical results prepared for NRA include the identification of any discrepancies and their potential cause. NRA explained the process for responding to discrepancies between the independent monitoring and TEPCO measurements and that the information required for a root cause analysis (e.g., quality assurance and control processes, analytical method/instrumentation used) should be defined in advance.

### **NRA's Updates**

- No updates about the description.
- The result of latest independent NRA's analysis of the nuclides are shown in the previous agenda item, and there was no significant discrepancy between NRA's and TEPCO's result.
- Also, NRA conducts operational safety inspection at TEPCO's analysis processes to oversight its quality management.

## Involvement of Interested Parties

### IAEA's review item

- The involvement of interested parties in further regulatory steps related to the ALPS treated water discharges.
- The involvement of interested parties in potential future changes to key aspects of the discharge such as the discharge limits or design for the discharge.
- Periodic updates on the Action Plan for the Continuous Implementation of the Basic Policy on Handling of ALPS Treated Water as it relates to the involvement of interested parties.
- How interested parties are involved over time to ensure that up-to-date habit data is considered as part of future reviews of the REIA and monitoring programmes.
- Information exchange and communication, as needed, with the Governments of neighbouring countries throughout the entire time when discharges of ALPS treated water are occurring.

### Related safety IAEA standards

- GSR Part 3, 2.19. The government shall establish mechanisms to ensure that: (a) The activities of the regulatory body are coordinated with those of other governmental authorities, in accordance with para. 2.15(e), and with national and international organizations that have related responsibilities; (b) Interested parties are involved as appropriate in regulatory decision-making processes or regulatory decision aiding processes.

### From the comprehensive report

- The NRA provided an overview of the actions undertaken for public communication and involvement of interested parties. The NRA highlighted that their main message to the public on ALPS Treated Water Discharge is: "*ALPS treated water discharge does not have substantial adversary effects to health and the environment as far as satisfying the regulatory requirements and it is necessary to progress the decommissioning of the FDNPS.*"
- The NRA highlighted to the Task Force their communication framework at the national level that consists of the following components:
  - Local government meetings held in prefectures around Fukushima;

- Explanations provided to political parties and interested groups after the adoption of the Basic Policy;
  - National diet sessions where the status of NRA's review and future schedules have been raised;
  - Regular press conferences for the provision of updated information to the public;
  - NRA's website where NRA posts the materials and minutes of the review meetings.
- At the international level, the NRA has held meetings with other countries and organizations and explained the up-to-date status around the ALPS treated water discharge. The NRA has provided and indicated their willingness to continue to provide information to neighbouring states as appropriate, including through the framework for cooperation among regulatory bodies, and the NRA response to questions submitted by other countries.

### **NRA's Updates**

- After the start of discharge of ALPS treated water, NRA oversees its operational status through NRA inspection. Also, NRA requires TEPCO to report its update at open meetings with representative from various stakeholders.