

NRA presentation

- **C Authorization Process**
 - C-2-3 REIA – Potential exposure**

OTSUJI YAMAMOTO Ayako
Nuclear Regulation Authority JAPAN

IAEA Regulatory Review Mission on ALPS Treated Water Handling
23 March 2022



Contents

1. NRA's view on potential exposure assessment
2. Review on potential exposure assessment
 - 2-1. Potential exposure scenarios
 - 2-2. Source term
 - 2-3. Exposure pathways
 - 2-4. The representative person
 - 2-5. Comparison of estimated doses and risks with criteria



1. NRA's view on potential exposure assessment



1. NRA's view on potential exposure assessment

Identification and Selection of Potential exposure scenarios

- Safety assessment is conducted by TEPCO in *“validity assessment of facility design upon unusual occurrences” assuming a single failure of the component.*
- The assessed unintended discharge amount is approximately 1.1m³, greatly smaller than the planned discharge amount per day (up to 500m³/day).
- In addition, safety assessment to identify potential exposure scenarios should be done *assuming failures more than a single failure or external hazards.*

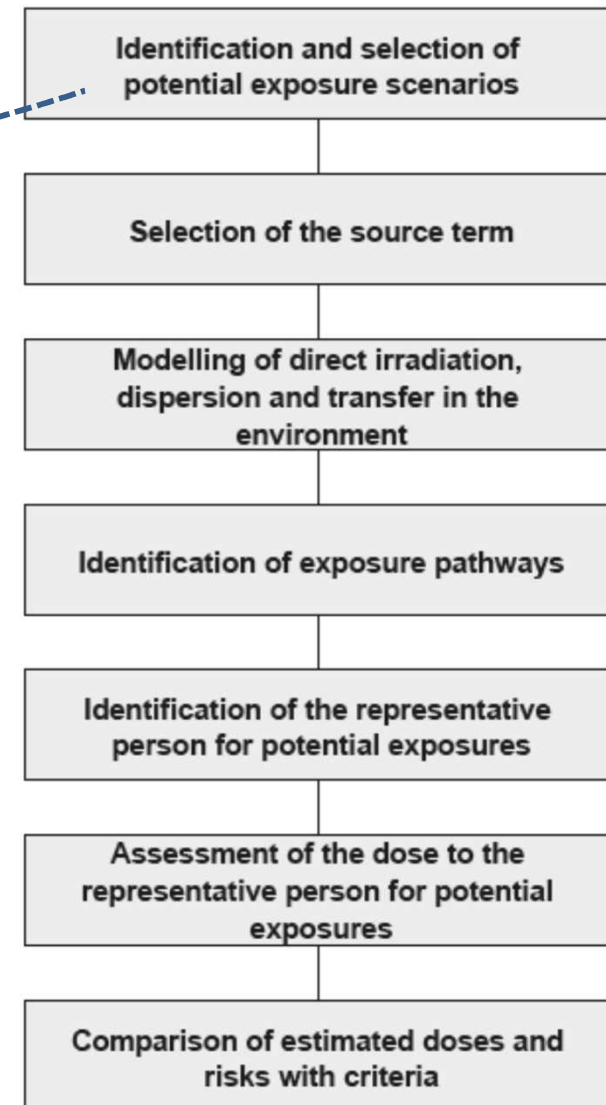


FIG. 3. Components of an assessment for consideration of potential exposures. (The figure is not intended as a detailed step by step procedure and is presented to illustrate the elements of the assessment and facilitate its description.)



1. NRA's view on potential exposure assessment

Approach to identification and selection of potential exposure scenarios

- No event progression is expected for the Discharge Facility, except continuation of unintended discharge.
⇒ **Deterministic approach is sufficient.**
- Not usual affiliated facility for nuclear reactor, but rather unique facility for this discharge
⇒ **The likelihood does not have to be determined, and the impact of the identified event without the likelihood should be compared with the criteria 5mSv/event.** The NRA has set this criteria referring to the value specified for a simple assessment with small inventories in GSG-10.



2. Review on potential exposure assessment



2. Review on potential exposure assessment

Major points to be clarified by TEPCO

- Concept of the assessment which does not follow the flow shown in Fig. 3 of GSG-10

Comments from the NRA for further clarification

- Consideration on possible internal exposure assuming the situations that unusual occurrences continue without being detected or countermeasures are delayed



TEPCO explained the revised assessment at the NRA Review Meeting on **18 March 2022**.



2-1. Potential exposure scenarios

During the review meeting on March 18, TEPCO explained:

- Identified scenario is:
 - ✓ ALPS treated water discharge without mixing with seawater, directly to the ocean through pipe, assuming seawater intake pumps are stopped and emergency isolation valves are not closed.
 - ✓ **The whole amount of one group of K4 tanks, approx. 10,000m³ ALPS treated water is discharged within 2 days.**

Points to be further clarified

- The postulated scenario to derive the amount of discharge, approx. 10,000m³, is unclear.



2-1. Source term

During the review meeting on March 18, TEPCO explained:

- The ratio of the nuclides other than tritium contained in ALPS treated water varies.
⇒ **Calculation assuming each of 63 nuclides is contained up to concentration limit** corresponding to the operational limit* (*the ratios of the radionuclides other than tritium to each concentration limit stipulated in the regulation is confirmed to be less than 1)
- ⇒ The largest impact among 63 nuclides is regarded as the assessment result, i.e., the assessment result of Te-127 which is the biggest contributor to external exposure.

Points to be further clarified

- The assumption that 63 nuclides are represented by Te-127 is extreme considering its half-life period.
- To be based on more realistic assumptions and then consider uncertainties



2-3. Exposure pathways

During the review meeting on March 18, TEPCO explained:

- In addition to one exposure pathway in the initial REIA (external exposure from the sea surface) , **adding the other exposure pathways to be on a conservative side:**
 - ✓ External exposure during underwater work
 - ✓ Internal exposure during underwater work
 - ✓ External exposure from ship hull, beach sand and fishing net
 - ✓ Internal exposure due to intake of seafood

Points to be further clarified

- None



2-4. The representative person

During the review meeting on March 18, TEPCO explained:

- The representative person is identified as a shipman exposed to radiation through all the exposure pathways identified.
- The end point: 2days later considering emergency protective actions



Source: TEPCO's material at the review meeting on 2022-03-14

Points to be further clarified

- None



2-5. Comparison of estimated doses and risks with criteria

During the review meeting on March 18, TEPCO explained:

- Effective dose is calculated using the largest concentration value within 1km from the discharge point: $2.4E-10\text{Bq/L}$
- External exposure is larger than internal exposure. Among 63 nuclides, Te-127 gives the biggest impact to external exposure.
- Assessment result with Te-127: $0.26\text{mSv/event} < \text{the criteria } 5\text{mSv/event}$

Points to be further clarified

- The assumption that 63 nuclides are represented by Te-127 is extreme considering its half-life period.
- To be based on more realistic assumptions and then consider uncertainties