

# **Fukushima Daiichi Nuclear Power Station Status of Review Regarding the Rearing Test of Marine Organisms**

July 29, 2021

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Tokyo Electric Power Company Holdings, Inc.

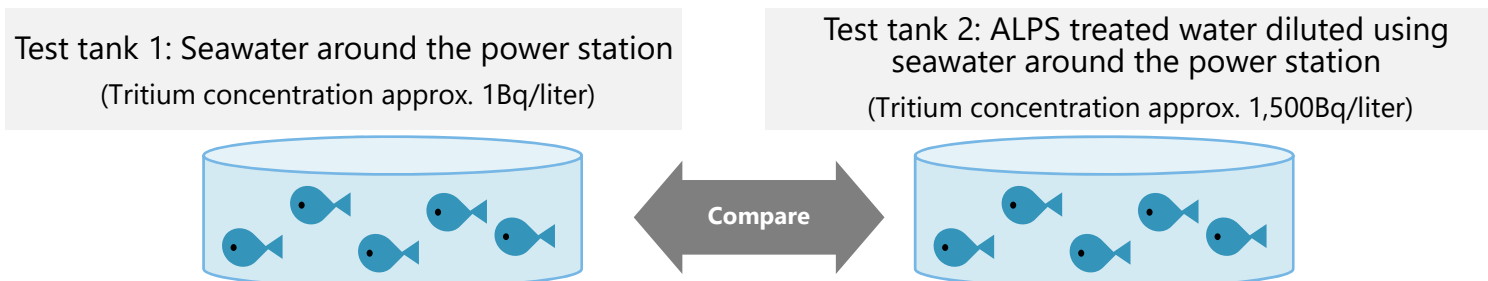
Cultivate understanding for the discharge of ALPS treated water, which would contribute to avoiding the adverse impacts on reputation, by rearing marine organisms in a seawater environment containing the water treated with the Multi-nuclide Removal Equipment (hereinafter “ALPS treated water”), and presenting the status to society in a highly transparent manner.

- Conduct rearing tests on fish, etc. in a marine environment containing ALPS treated water prior to and after the discharge of ALPS treated water into the sea.
- Opinions from experts and fisheries stakeholders shall be considered in preparing the trial environment, selecting trial subjects and setting items to be confirmed in the rearing tests.
- Conduct risk communication activities with the local community and other various stakeholders from the stage of planning rearing tests. If necessary, apply feedback received from the activity to the plan.
  - The status/progress of the fish rearing tests shall be disclosed when necessary to ensure transparency.

# Rearing test: (1) Prior to discharge of ALPS treated water

Conduct rearing tests on marine organisms in seawater and ALPS treated water diluted using seawater, and confirm the status of its development.

Trial environment	<ul style="list-style-type: none"><li>• Comparative trial using seawater in the periphery of Fukushima Daiichi NPS [test tank 1] and ALPS treated water diluted using seawater in the periphery of Fukushima Daiichi NPS [test tank 2].</li><li>• Rearing shall be conducted on land using a closed circulation system*, and its surrounding area shall be designated as a radiation controlled area.</li><li>• Other than the difference in water used for test tanks 1 and 2, the rearing conditions shall be identical .</li></ul> <p style="text-align: right;">※ Water used for rearing shall be cleaned and circulated using a filtration system</p>
Trial subjects	<ul style="list-style-type: none"><li>• Subject organisms shall be selected from those that have previously been farm-raised within the country.</li><li>• Details on the species (of fish, shellfish, seaweed etc.) and morphology (young or matured) of marine organisms shall be decided based on input from experts.</li><li>• Rearing shall be initiated from test tank 1, and rearing in test tank 2 shall be initiated after collecting data for rearing. Comparative tests shall be conducted after this.</li></ul>
Information to be disclosed	<ul style="list-style-type: none"><li>• Health-related abnormalities or lack, comparison of concentration of radioactive materials including tritium in water used for trial and subjects' body.</li><li>• Hatching rate of eggs, survival rate of matured fish (or number of deaths)</li><li>• Live streaming of the rearing status</li></ul>



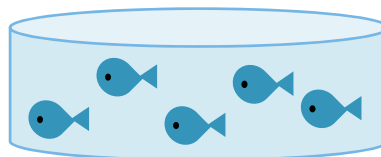
## Rearing test : (2) After initiating the discharge of ALPS treated water

Conduct rearing tests on marine organisms under an environment where water is diluted with seawater and actually discharged into the environment and confirm the status of their development.

Rearing is planned to be continued for a while after discharge has been initiated. The timing of conclusion will be determined based on whether the objectives of the rearing tests has been achieved.

Trial environment	<ul style="list-style-type: none"><li>• Rear organisms using water diluted with seawater and actually discharged into the environment.</li><li>• Rearing shall be conducted on land using a free-flowing system*, and its surrounding area shall be designated as a non-radiation controlled area.</li></ul> <p style="text-align: right;">※ Continuous intake of seawater from the natural environment and used as rearing water</p>
Trial subjects	<ul style="list-style-type: none"><li>• Subject organisms shall be selected from those that have previously been farm-raised within the country.</li><li>• Details on the species (of fish, shellfish, seaweed, etc.) and morphology (young or matured) of marine organisms shall be decided based on input from experts.</li></ul>
Information to be disclosed	<ul style="list-style-type: none"><li>• Health-related abnormalities or lack, comparison of concentration of radioactive materials including tritium in water used for trial and subjects' body.</li><li>• Hatching rate of eggs, survival rate of matured fish (or number of deaths)</li><li>• Live streaming of the rearing status</li></ul>

Test tank: water discharged into the environment  
(Tritium concentration  $\leq$  approx. 1,500Bq/liter)



Challenges for conducting trials include working around legal constraints and setting appropriate confirmation items

## legal constraints

[Rearing test (1) prior to initiating the discharge of ALPS treated water]

- Water used for rearing must be handled in accordance with the Reactor Regulation Act, which involves actions such as setting the rearing area as a radiation controlled area.

[Rearing test (2) after initiating the discharge of ALPS treated water]

- Seawater (from the natural environment) will be used for rearing; thus, it must be handled in the same manner as “environmental samples”.
  - The location of water intake shall be selected so that rearing is conducted using “environmental samples”.

## Setting confirmation items

- Identifying the cause in the event of a developmental abnormality
  - Test tank may require partitioning in accordance with water quality and environmental conditions.
- Identifying cause of death when survivability is set as a confirmation item
  - Difference in individual specimen.
  - Confirmation over a long term becomes difficult if an annual algae is selected for rearing.
- Isotope to be measured
  - Consider the perspective of avoiding the adverse impacts on reputation.

Disclose information on the initiation of rearing tests and its following status in a timely and appropriate manner

## Initiation of rearing test

- Purpose and overview of the rearing tests, fundamental information on organic contamination of tritium
  - For example, the amount of tritium in fish being equivalent to the concentration in its rearing environment



## Status of rearing test

- Constant: Live streaming using monitoring camera
- Periodic: rearing environment (water quality, temperature, etc.), rearing condition (fluctuation in the number of organisms being reared, etc.), analysis results (comparison of internal tritium concentration and tritium concentration in seawater, etc.)



## Occurrence of abnormality

- Details and cause of abnormality



## Conclusion of Rearing test

- Summary of the rearing tests

# Schedule



	FY2021				FY2022			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
<b>Review, resolution of challenges</b>	Continuously hold discussions with fisheries stakeholders and the local community							
<b>Design, construction of rearing facility</b>	Design based on prerequisites		Make changes to design or modify facilities if necessary					
<b>Rearing using seawater from the periphery of power station</b>			Initiate rearing	Practice rearing, resolve issues in rearing				
<b>Rearing using ALPS treated water diluted using seawater from the periphery of power station</b>					Initiate rearing test			
<b>Analysis, assessment, etc.</b>								

## [Reference] Current status on the review of rearing facilities **TEPCO**

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- Tentative parameters set for reviewing rearing facilities
  - Isotopes subject to assessment: tritium
  - Marine organism to be reared: flounder (size of specimen should be around 30cm – 40cm or below to facilitate ease in handling)
    - Shellfish (details currently under review)
    - Seaweed (details currently under review)



- Multiple pools with dimensions of 3m<sup>2</sup> by 1m in depth shall be connected for rearing flounders
  - The dimension above is optimal for rearing based on past experience.
    - ✓ Easy to cleanup leftover food and to capture flounders for analysis.
  - Connecting the pools increases the volume of water, making it easier to maintain the rearing environment (water control).

Details such as the number of pools and the location of its installation shall be reviewed in the future.