

Status of Review Regarding the Handling of ALPS Treated Water [Overview]



August 25, 2021

Tokyo Electric Power Company Holdings, Inc.

- Regarding the handling of water treated with multi-nuclide removal equipment (hereinafter referred to as ALPS treated water), the review of facility design and operation are in progress with a view to taking thorough actions to minimize adverse impact on reputation with premises securing safety and based on the government's basic policy announced in April.
- The status of reviews mentioned above have been presented at the NRA's commission on supervision and evaluation of the specified nuclear facilities.
- This document summarizes the status of review of detailed designs and operation of facilities for securing safety, which includes that of intake/discharge facilities and sea area monitoring which have been considered, and the status of measures to respond to adverse impacts on reputation and reputational damage.
- We will continue to carefully listen to opinions from people in the region and parties concerned, and make changes to facility design and its operation if necessary.

Government's Basic Policy and TEPCO Holding's Action **TEPCO**

Inter-Ministerial Council for Contaminated Water, Treated Water and Decommissioning Issues, April 13, 2021

Basic Policy on handling of ALPS treated water at the Tokyo Electric Power Company Holdings' Fukushima Daiichi Nuclear Power Station (Hereinafter "government's basic policy")

The ALPS treated water will be discharged on the condition that full compliance with the laws and regulations is observed, and measures to minimize adverse impacts on reputation are thoroughly implemented.

Must comply with the regulatory standards for safety and ensure the safety of the public, environment, agricultural, forestry and fishery products and others in the surrounding areas as it was always been.

Confirm that the water is purified until the level of radioactive materials other than tritium satisfies the regulatory standards for safety.

The target concentration of tritium should be the same as the operational target (less than 1,500Bq/Liter-water) for the currently implemented discharge of water pumped up via sub-drains, and the total annual amount of tritium to be discharged will be at a level below the operational target value for tritium discharge of the Fukushima Daiichi NPS before the accident (22 trillion Bq/year).

Considering relevant international laws, etc., measures shall be taken to assess the potential impact on the marine environment, and the Government will ensure a high degree of transparency by availing the information regarding the impact on the environment to the public in a timely manner.

The Government and TEPCO will strengthen and enhance monitoring before and after the discharge.

Preparing for future disasters and others, adequate safety measures, etc. for the tanks installed on site of Fukushima Daiichi NPS are required.

To minimize adverse impacts on reputation, foster the understanding of the general public and the international community and conduct measures for the production, processing, distribution, and consumption phases of affected industries.

If reputational damage occurs, even after taking possible preventive measure, the Government will instruct TEPCO to provide speedy compensation.

Tokyo Electric Power Company Holdings, Inc., April 16, 2021

TEPCO Holdings' Action in Response to the Government's Policy on the Handling of ALPS Treated Water from the Fukushima Daiichi Nuclear Power Station

Implement the following in line with the government basic policy

Ensure the safety of the public, surrounding environment as well as agricultural, forestry and fishery products through conforming to safety standards based on laws and confirming the safety of the water to be discharged.

Purify and treat radioactive materials other than tritium as many times as necessary, which be confirmed before dilution prior to discharge.

Tritium will be diluted with enough seawater to concentrations to the current operational target value for the tritium concentration in drainage of subdrain (less than 1,500 Bq/L). In the near term, the amount of tritium discharged will be less than the discharge management target value (22 trillion Bq/year) for Fukushima Daiichi before the accident.

To dispel concerns and foster understanding of parties concerned both domestically and internationally, we will continuously provide accurate information in a highly transparent manner, regarding the impacts on the environment such as the results of assessment of the radiation impact on the public and the environment.

Further expand and strengthen our sea area monitoring efforts to minimize adverse impacts on reputation.

For the tanks on site, the water will be continuously monitored for leaks and maintained and managed appropriately to prepare for further natural disasters.

Concentrate on initiatives for the production, processing, distribution and consumption in the relevant industries that could be impacted by reputational damage.

Appropriately and swiftly compensate for losses, if reputational damage is incurred despite measures to minimize the adverse impacts on reputation.

I Design and Operation of Facilities for Securing Safety

1. Overview of facilities for securing safety, status of review
2. Sea area monitoring
3. Rearing test of marine organisms
4. Future schedule
5. Investigation regarding tritium separation technology

II Measures to respond to Adverse Impacts on Reputation and Reputational Damage

1. Communication for fostering understanding domestically and abroad
2. Measures implemented in production/processing/distribution/consumption
3. Measures implemented if there is any reputational damage

1-1. Status of review regarding facilities for securing safety ①



Measurement/ confirmation facility

[K4 tank group]

Measure tritium, 62 radionuclides and Carbon-14 in ALPS treated water prior to its dilution and discharge (including measurements by 3rd parties), and confirm that the 62 radionuclides and Carbon-14 have been removed to levels below the regulatory standard value for environmental discharge.

- Regarding ALPS treated water, (1) receive, (2) measure, take measurement and confirm that the sum of ratios of the concentration to the regulatory standard of 62 radionuclides + Carbon 14 is less than one, (3) discharge, installation of tank groups (approx. 30,000m³) with roles to be played in rotations.
- Construct tanks in the G4 North and G5 areas to secure the capacity for substitute storage required when diverting the K4 area tank groups near ALPS to the role of measurement and confirmation facilities (repurposing).

Diluting facility

[Newly installed
seawater pump]

Dilute adequately using seawater of more than 100 times so that the tritium concentration after seawater dilution is less than 1,500 Becquerel/liter* and the annual discharge of tritium is below 22 trillion Becquerel. The concentration and volume of tritium to be discharged shall be reviewed at the end of every fiscal year based on the latest data available at the time to be kept as low as possible.

A total of three seawater transfer pumps for dilution, each with a capacity of 170,000m³/day shall be installed (tritium concentration after seawater dilution is assumed to be approx. 440 Becquerel/liter and is well below 1,500 Becquerel/liter even if the annual operation rate is 80%, annual tritium discharge volume is 22 trillion Becquerel and one pump being online.)

ALPS treated water after seawater dilution shall be sampled every day during discharge, and its tritium concentration to be confirmed well below 1,500 Becquerel/liter, and the information will be made public promptly.

Furthermore, for the time being, discharge shall be initiate after directly confirming the status of mixture and dilution utilizing the discharge vertical shaft prior to discharge into the sea.

*1/40th of the legally required concentrations (60,000Bq/liter) and approx. 1/7 of the WHO standard for drinking water (10,000Bq/liter).

1-2. Status of review regarding facilities for securing safety ②



Intake/discharge facility

[Unit 5 intake, undersea tunnel]

ALPS treated water will be diluted using seawater from outside the harbor to avoid impact of radioactive material in the harbor, and discharged via the undersea tunnel dug through bed-rock (approx. 1km) to prevent discharged water from recirculating into the seawater taken in.

- In addition to taking in seawater from outside the harbor to avoid impact of radioactive concentration of seawater in the harbor, use a partitioning weir to separate seawater in the harbor from seawater for dilution.
- The point of discharge shall be within the area where no fishing is conducted* on a daily basis (approx. 60 billion liters of seawater exists in the subject area)
*area where common fishery rights are not set
- Details for the undersea tunnel shall be reviewed after conducting sea boring survey

Measures in the event of abnormality

[Emergency isolation valve]

In the event of an abnormality in the dilution rate and properties of ALPS treated water, the emergency isolation valves shall be closed promptly and the transfer pump shall be shut down and the discharge stopped.

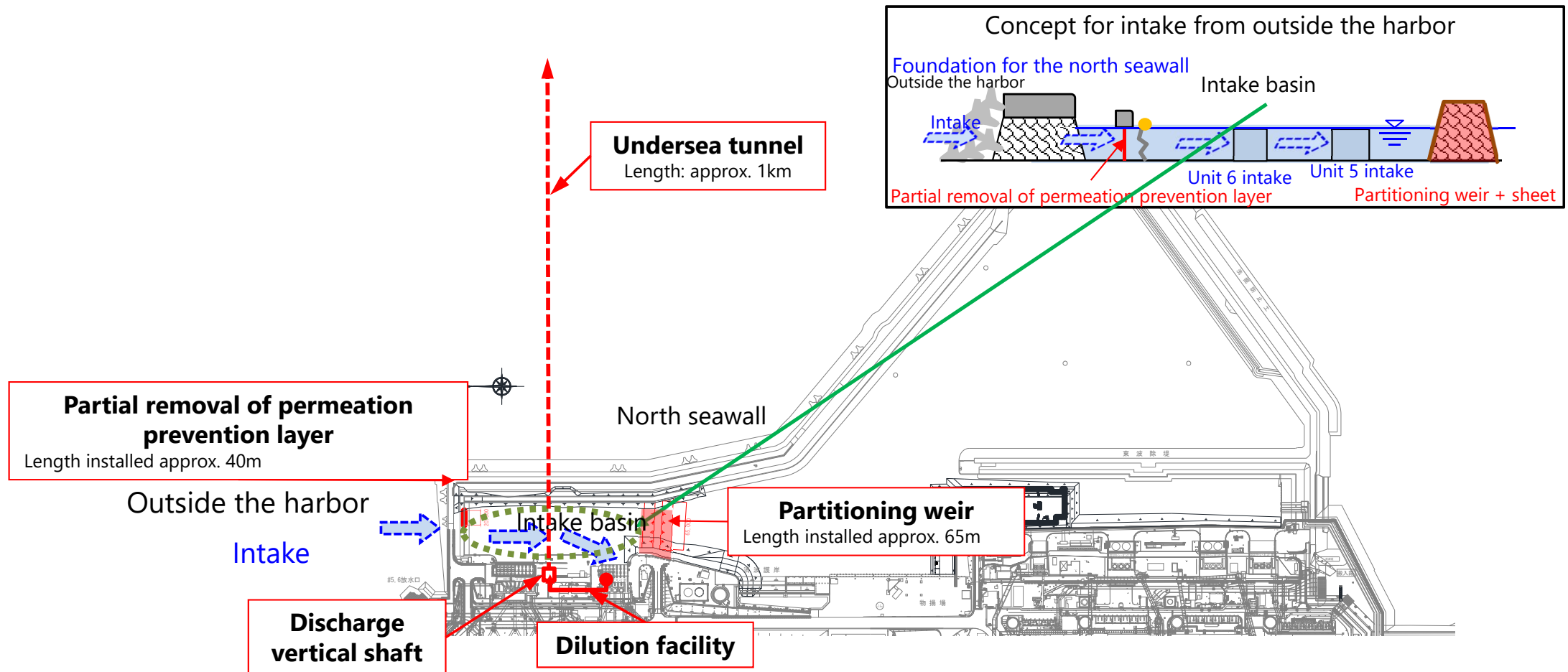
•Two emergency isolation valves shall be installed to ensure redundancy with one emergency isolation valve being installed within the seawall as tsunami counter-measures and another installed at the point before mixing with seawater for dilution as measures to minimize discharge amount. •Although not an abnormality in facilities, discharge shall also be stopped if abnormal values are confirmed in the sea area monitoring.

Other

- Assign the Chief Officer for ALPS treated water management and establish an organization specialized for ALPS treated water discharge work (ALPS treated water program department) to safely and thoroughly execute the discharge of ALPS treated water into the sea.
- Facilities related to discharge ALPS treated water into the sea shall be designed with the same seismic class as previous facilities used to handle ALPS treated water.
- Secure auxiliary parts for pump and flow meter to reduce the time required for restoration in the event of a natural disaster.

1-3. Harbor design

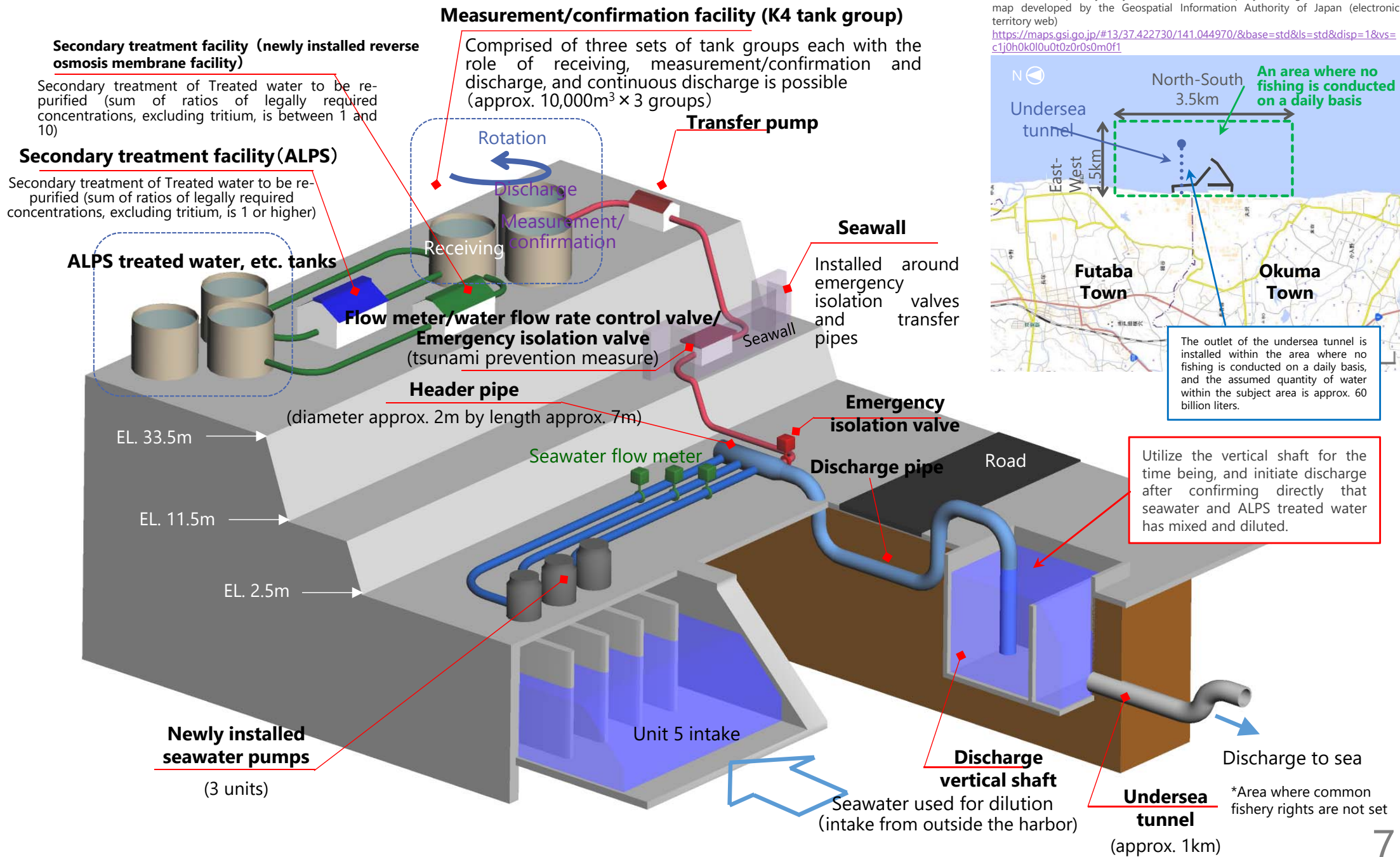
- Modify the north seawall to allow the intake of seawater outside the harbor for use in dilution, and **prevent seawater inside the harbor from mixing directly with the seawater for dilution** by separating from inside the harbor using a partitioning weir.
- The harbor shall be designed to discharge from approx. 1km from the coast to make it **difficult for seawater to recirculate** (unlikely for discharge to go through intake again as seawater for dilution).
- Details for the undersea tunnel shall be reviewed after conducting sea boring survey



1-4. Overview of facilities for securing safety (minimize adverse impacts on reputation)



Source: Developed by Tokyo Electric Power Company Holdings, Inc. based on the map developed by the Geospatial Information Authority of Japan (electronic territory web)
<https://maps.gsi.go.jp/#13/37.422730/141.044970/&base=std&ls=std&disp=1&vs=c1j0h0k0l0u0t0z0r0s0m0f1>

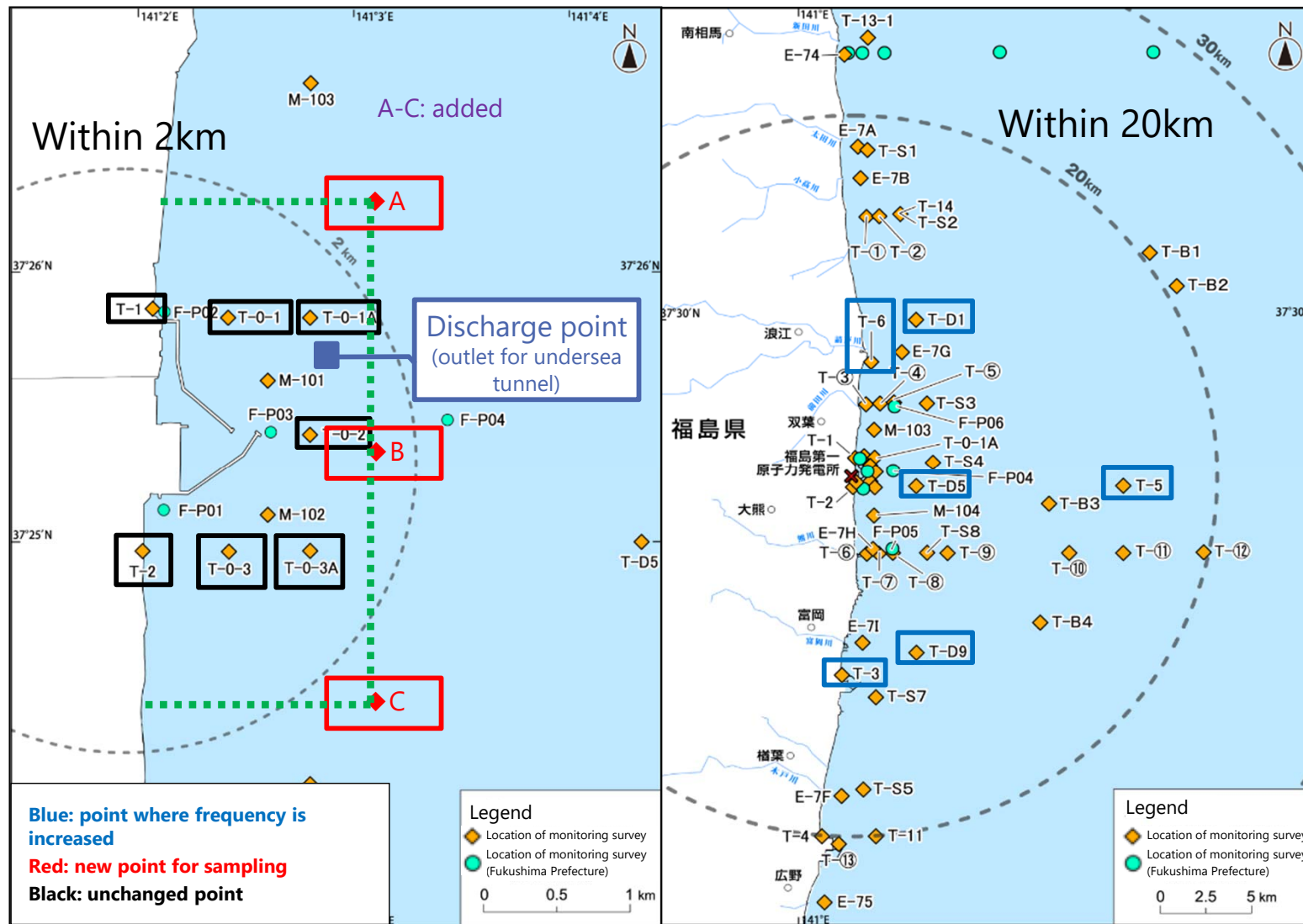


2-1. Sea area monitoring (plan)

- Strengthen monitoring to confirm the status of tritium dispersion to the sea and the status of the transfer of radionuclides to fish and seaweed.

Subject	Area sampled	Subject of measurement	Current frequency	After change (draft)	Remarks
Seawater	Inside the harbor	10 locations	Cesium : Daily Tritium : Weekly	Cesium : Daily Tritium : Weekly	Perform daily for discharge vertical shaft (discharge end)
	Within 2km (and the vicinity)	7 locations	Cesium : Weekly Tritium : Weekly	Cesium : Weekly Tritium : Weekly	Added three sampling areas (10 areas in total)
	Within 20km	6 locations	Cesium : Weekly Tritium : Every two weeks	Cesium : Weekly Tritium : Weekly	Doubled the analysis frequency of tritium
	Outside 20km (off the coast of Fukushima)	9 locations	Cesium : Monthly Tritium : 0 times	Cesium : Monthly Tritium : Monthly	Added tritium
Fish	Within 20km	Cesium134,137 Strontium Tritium	Cesium : Monthly (11 locations) Strontium : Quarterly (Top five samples for cesium concentration) Tritium : Monthly (one location)	Cesium : Monthly (11 locations) Strontium : Quarterly (Top five samples for cesium concentration) Tritium : Monthly (11 locations)	Fish are currently sampled at 11 locations to analyze cesium and tritium is analyzed in one of those locations. After the change, tritium analysis is conducted in the remaining ten locations
Seaweed	Inside the harbor	Cesium134,137	Cesium : Three times annually (one location)	Cesium : Three times annually (one location)	Conducted three times annually in March, May and July
	Outside the harbor	Cesium134,137 Iodine 129 Tritium	Cesium : 0 times Iodine : 0 times Tritium : 0 times	Cesium : Three times annually (two locations) Iodine : Three times annually (two locations) Tritium : Three times annually (two locations)	Added two locations outside the harbor Conducted three times annually in March, May and July (Review based on survey of habitat)

2-2. Sea area monitoring (e.g.: inside the harbor – seawater within 20km)



Tritium analysis point (analyze at all points in the harbor)

Area where no fishing is conducted on a daily basis ※
East-West 1.5km North-South 3.5km

※Area where common fishery rights are not set

The addition of analysis points for sea area monitoring shall be reviewed separately while considering the government monitoring coordination meeting

3. Rearing test of Marine Organisms

- Foster understanding for the discharge of ALPS treated water into the sea and avoid adverse impacts on reputation by rearing marine organisms in seawater containing ALPS treated water and presenting that tritium concentration in marine organisms do not differ (do not become concentrated) from the seawater tritium concentration.
- Based on comments received through communication activities from parties concerned, such as the local community, shall be applied to the plan if necessary. The status and progress in rearing tests shall be disclosed when necessary.

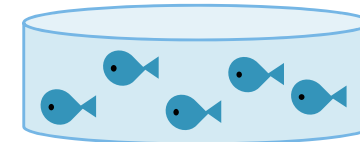
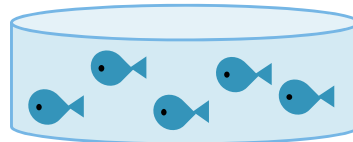
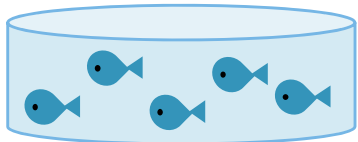
Prior to discharge of ALPS treated water into the sea



After initiating the discharge of ALPS treated water into the sea

Confirm the status of its development in seawater (test tank 1) and ALPS treated water diluted using seawater (test tank 2)

Confirm the status of its development under an environment where water is diluted with seawater and actually discharged into the environment.



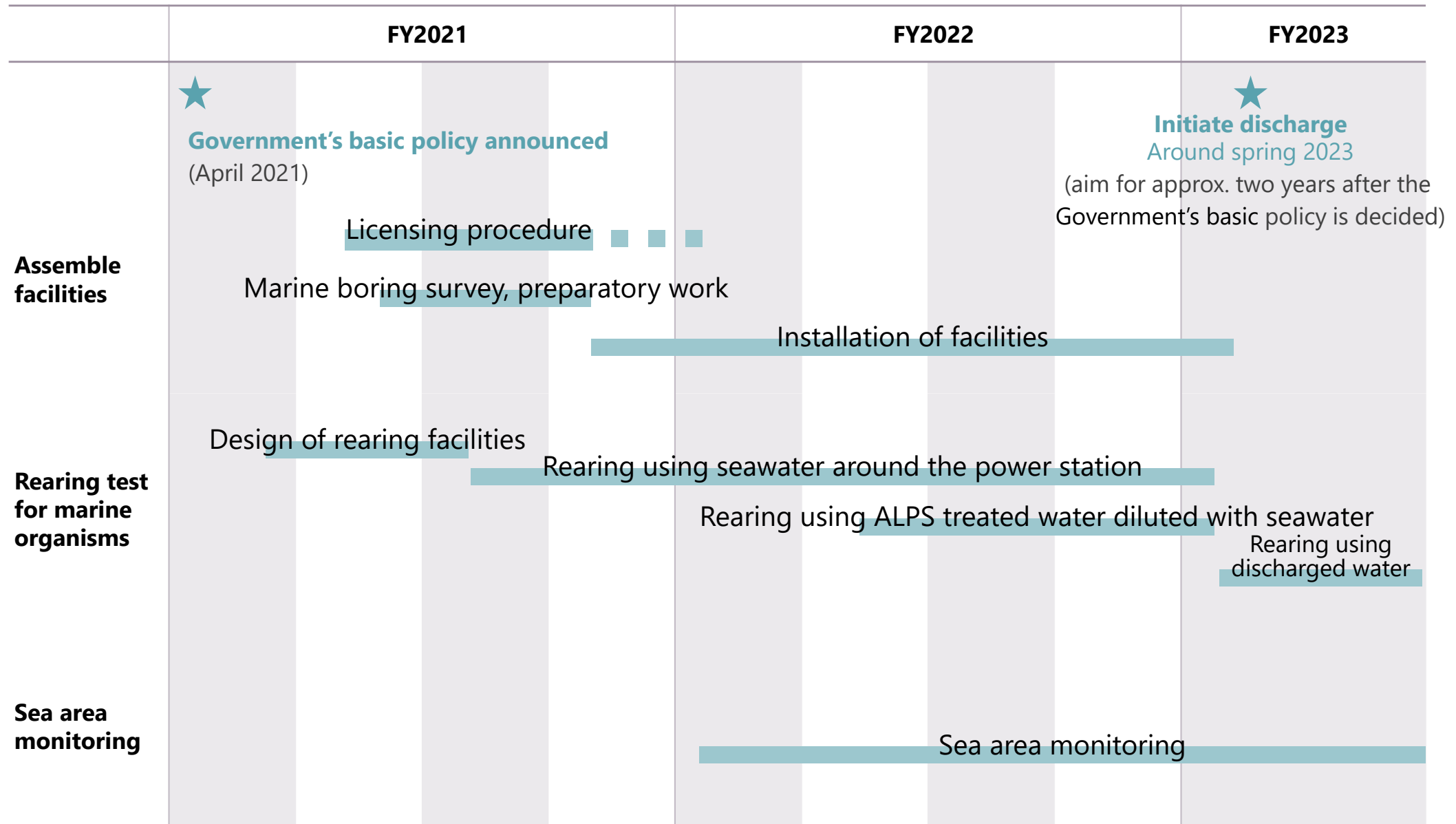
Test tank 1: Seawater around the power station (Tritium concentration approx. 1Bq/liter)

Test tank 2: ALPS treated water diluted using seawater around the power station (Tritium concentration approx. 1,500Bq/liter)

Test tank: water discharged into the environment (Tritium concentration < 1,500Bq/liter)

Subject to be reared [Both before and after initiating discharge of ALPS treated water into the sea]
Fish: flounder (size of specimen should be around 30cm –40cm or below)
Shellfish: details currently under review
Seaweed: details currently under review

4. Future schedule



- The duration for licensing procedure is not final.
- This draft schedule is subject to revision in accordance with future survey and review results.
- In addition to the above, the assessment results regarding the impact of radiation on humans and the environment shall be disclosed in the future.

5. Investigation regarding tritium separation technology

- The Nine Sigma Holdings Inc. was selected as the third-party partner for securing transparency regarding eliciting proposals and promoting wide-scale research on tritium separation technology. An open call webpage was setup in the company website, and research and reception of proposals on tritium separation technology both domestic and abroad was initiated.
- Technologies proposed shall be confirmed/evaluated regarding the details of such technology and advice shall be provided as necessary by Nine Sigma Holdings Inc.. The results will then be examined by TEPCO, and if it turns out that the technology is able to be realistically applied to ALPS treated water, etc., detailed designs will be drawn up and verification tests of the technology shall be conducted.



Technology to Separate Tritium from Water Treated with Multi-Nuclide Removal Equipment (ALPS)

As of May 2021, the existence of a technology to separate tritium from water treated with multi-nuclide removal equipment (ALPS) (hereinafter, "ALPS treated water, etc. ") at Tokyo Electric Power Company Holdings, Inc., (hereinafter, "TEPCO") Fukushima Daiichi Nuclear Power Station.

In response to the government's basic policy of the handling of ALPS treated water, etc., TEPCO announced the measures regarding ALPS treated water, etc. in April 2021 as follows:

- TEPCO will proceed with the preparation for establishing the necessary facilities, etc. aiming for starting discharge of ALPS treated water ¹ into the sea in around two years⁴ time.

Number of tanks ² 1,047 <small>(as of April, 1 2021)</small>	Amount of water being stored in tanks ² Approx. 1.25million m ³ <small>(as of April, 1 2021)</small>
Average tritium concentration ² Approx. 620,000Bq/L <small>(as of April, 1 2021)</small>	Total amount of tritium ² Approx. 780trillionBq <small>(as of April, 1 2021)</small>

Open call webpage

[Japanese] <https://www.ninesigma.com/s/TEPCO-galleryJP>
[English] <https://www.ninesigma.com/s/TEPCO-galleryEN>

I Design and Operation of Facilities for Securing Safety

1. Overview of facilities for securing safety, status of review
2. Sea area monitoring
3. Rearing test of marine organisms
4. Future schedule
5. Investigation regarding tritium separation technology

II Measures to respond to Adverse Impacts on Reputation and Reputational Damage

1. Communication for fostering understanding domestically and abroad
2. Measures implemented in production/processing/distribution/consumption
3. Measures implemented if there is any reputational damage

1. Communication for fostering understanding domestically and abroad **TEPCO**

Thoroughly address questions regarding discharge of ALPS treated water into the sea and concerns regarding adverse impacts on reputation, provide thorough explanation to parties concerned, deepen understanding of people both domestic and abroad including consumers by disseminating accurate information in an easy-to-understand manner through the use of various mediums.

Disseminate information based on scientific evidence, and respond to questions and concerns

- **Communication with those in the fishery industry and distribution companies**
 - Repeatedly hold dialogue to thoroughly explain safety measures to dispel concerns and measures against adverse impact on reputation
- **Communication with the local community and consuming area**
 - Respectfully and concretely convey frequently asked questions regarding the property of tritium and ALPS treated water, the mechanism used for treatment, monitoring system, etc. while being aware of the perspective of the local communities and consumers.
 - Deliver relevant information to nearby residents through the use of publicity papers.
- **Providing information to domestic and overseas press**
 - The initiatives below were taken actively to deliver accurate information both domestic and abroad
 - * Encouraged on-site media coverage
 - * Explanatory sessions with the press
- **Providing information to key figures**
 - Encouraging on-site visits, explaining initiatives, etc.



Publicity paper HairoMichi (issued June 2021)

1. Communication for fostering understanding domestically and abroad

Disseminate information based on scientific evidence, and respond to questions and concerns

Fostering understanding abroad (coordinate with government)

- Multilingualization of tools to foster understanding
 - Treated water portal site
 - Tritium pamphlet
- Respond to media coverage from abroad
- Providing explanation to embassies



Etc. Treated water portal site (English version)

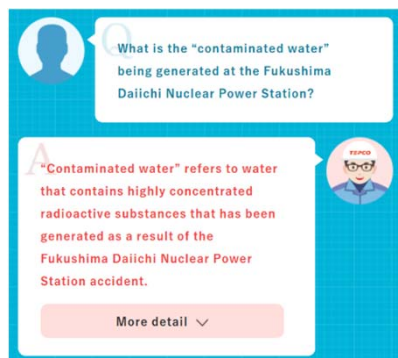


Tritium pamphlet

Published English, Chinese (simplified/traditional) and Korean version

Updating the website, "treated water portal", utilizing videos and social media

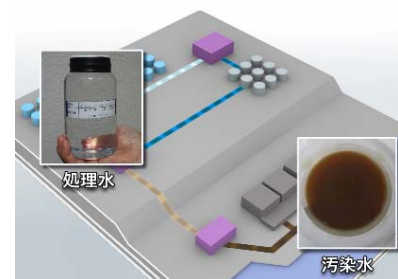
- Further enhance and strengthen the Q&A section to ensure peace of mind in consumers and people abroad.



Treated water portal site Q&A section



Treated water portal site



Explanatory video (Shown at the Decommissioning Archive Center)

1. Communication for fostering understanding domestically and abroad **TEPCO**

Secure transparency of initiative

- **Conduct of highly objective measurement and confirmation for radioactive material contained in ALPS treated water**
 - Confirm tritium concentration before dilution using seawater, confirm status regarding the removal of radioactive material other than tritium
 - Conduct measurement and confirmation by a third parties, and publish results every time.
 - Have the local agricultural, forestry, and fishery producers and local government officials participate and observe in sampling during measurement.
- **Strengthen and expand monitoring before and after discharge**
 - Expand sea area monitoring from approx. one year before discharge, and publish results on a timely basis.
- **Receive review on safety by the International Atomic Energy Agency (IAEA)**
- **Rear fish in environment where seawater contains ALPS treated water, and disclose results**
- **Expand opportunities for visits**
 - Further expansion of opportunities for locals to participate in visits and discussions (coordinate with government)
 - Active use of online visits
 - Promote initiatives to expand the number of visitors to the Hamadori area
 - Actively provide information regarding accommodation, dining and tourism to guests visiting the power station and the Decommissioning Archive Center

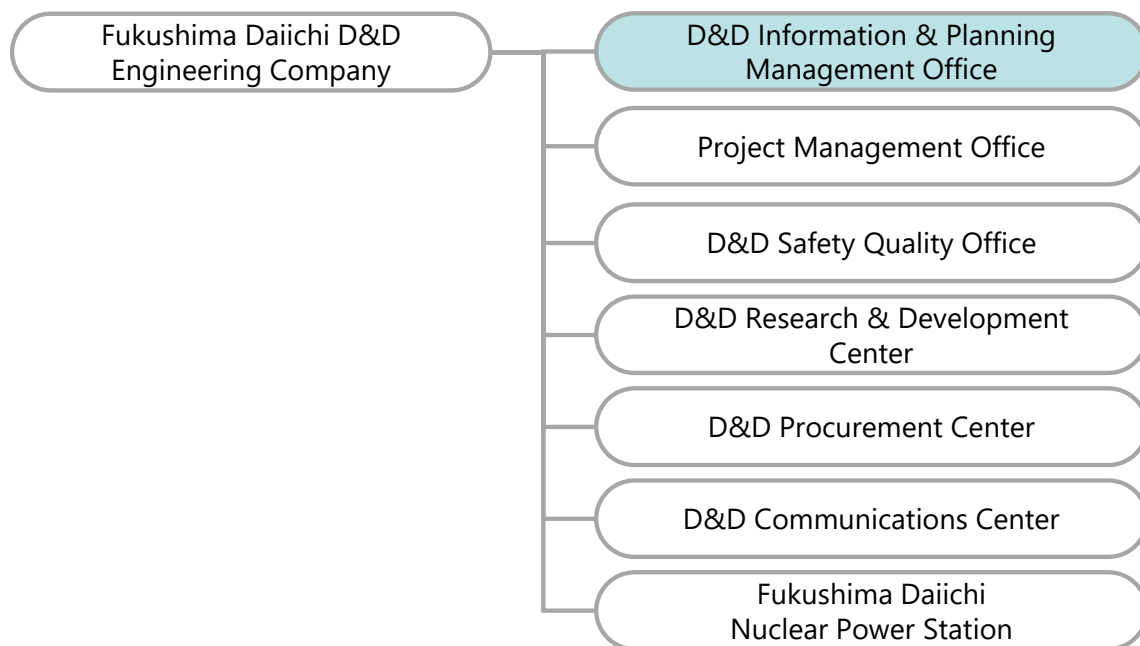


Online visit using virtual tour video

1. Communication for fostering understanding domestically and abroad

Strengthen organization to sufficiently provide information that addresses the concerns of regional residents and society

- Established a D&D Information & Planning Management Office (August 2021) to improve information conveyed which addresses the concerns of the region and society.
- Strengthened commanding capabilities for company-wide initiatives to foster understanding for the discharge of ALPS treated water into the sea. (August 2021)
- Strengthen organization for responding to nearby prefectures such as Miyagi and Ibaraki (September 2021)



Organization chart for the Fukushima Daiichi D&D Engineering Company
(August 1, 2021~)

- Unable to sufficiently provide information that addressed the concerns of regional residents and society in the wake of the earthquake that in February 2021
- Established a D&D Information & Planning Management Office within the FDEC as an organization that can always keep the region and society in mind, and quickly convey information that is highly transparent.

2. Measures implemented in production/processing/distribution/consumption

Initiatives for industries in the level of production, processing, distribution and consumption which could suffer adverse impacts on its reputation shall be strengthened and expanded, and necessary measures shall be taken through dialogue and discussion with parties concerned.

Cultivate market and expand consumption of agricultural, forestry, and fishery products of Fukushima

- Strengthen and expand sales of fishery products by holding sales events and fairs at retail stores and restaurants as well as promoting sales on EC websites in response to the novel coronavirus.
- Expand consumption in the Fukushima Supporting Companies Network
- New support for broker and processor through the Fukushima Soso Reconstruction Promotion Organization



Sales booth at a retail store

Country-wide promotion of fishery products

- Take initiatives contributing to fisheries promotion in and around Fukushima and the rest of the country, and efforts will be made to recover the nation's consumption of fishery products. With the cooperation of the Federation of Electric Power Companies of Japan, held events for the purpose of selling catalogues for processed fishery products and to promote the consumption of fishery products in the metropolitan and major consumption areas.

Enhancing and expanding measures through dialogue and discussion with parties concerned

- Comments will be received in the future from parties concerned in Fukushima and other neighboring prefectures, and appropriate measures shall be taken. Parties concerned in Miyagi Prefecture and Ibaraki Prefecture shall be given thorough explanations, and on-site organization for holding dialogue and discussion shall be strengthened/developed.

3. Measures implemented if there is any reputational damage

If reputational damage occurs following the discharge of ALPS treated water despite the measures being taken to minimize adverse impacts on reputation, compensation shall be provided rapidly and appropriately.

Damages resulting from the discharge of ALPS treated water shall be compensated without putting a restriction beforehand on the compensation period, area or industry that can be compensated

- Listen carefully to learn about circumstances regarding reports of reputational damage incurred before the discharge of ALPS treated water, and respond rapidly and appropriately.
- Listen carefully to learn about circumstances regarding indirect damages as well, and respond appropriately.
- Respond as a separate and new damage case even if differing compensation has been paid in lump sum for the future.

Respond flexibly to minimize the impacts on the persons to which the damage was sustained

Make maximum use of past principles and systems regarding compensation regarding the calculation and claim for reputational damage.

- In presuming damage, make use of statistics for the region and industry to propose ways to reduce the work load for the person making the claim
- In calculating the cost of damages, propose the use of documents that have been submitted, and respond flexibly accounting for the circumstances of the business.

Explain carefully in response to the concerns of stakeholders

- Carefully explain specific standards for compensation through visits and explanatory sessions in response to the concerns.
- The details of system for compensation regarding reputational damage shall be put into shape with hearing the opinion of all relevant personnel.