Attachment 1

Application for approval to amend the Implementation Plan Regarding the Handling of ALPS Treated Water [Overview]

December 21, 2021

Tokyo Electric Power Company Holdings, Inc.

Introduction

- Taking into consideration the Japanese government's basic policy decided in April, a review of details of the design and operation of facilities for the handling of ALPS treated water at Fukushima Daiichi Nuclear Power Station has been in progress with safety as a major premise to take thorough actions to minimize adverse impacts on reputation.
- The status of review has been presented in past the Commission on Supervision and Evaluation of the Specified Nuclear Facilities and in the Status of Review Regarding the Handling of ALPS Treated Water (announced on August 25, 2021).
- The status of review of details of design and operation of facilities to secure safety presented on August 25 have been summarized. Based on this summary, we have submitted the Application documents for Approval to amend the Implementation Plan for Fukushima Daiichi Nuclear Power Station Specified Nuclear Facility to the Nuclear Regulation Authority (NRA).
- TEPCO will continue to carefully listen to the opinions from people in the region and parties concerned and will incorporate opinions into the design and operations of facilities as appropriate.

1. Overview of the Implementation Plan

Ⅱ 2.50 ALPS treated water Dilution/Discharge facility and related facilities

- The details of design of the following major equipment were added to the Implementation Plan.
  1. Measurement/confirmation facility
  2. Transfer facility
  3. Dilution facility
  4. Discharge facility

Ⅲ Part 3 Supplementary Explanation of Security

2 Supplementary explanation on radioactive waste management

- The followings regarding the discharge of ALPS treated water into the sea were added
  1. Management method
  2. Dose assessment
  3. Action in response to the Basic Policy on handling of ALPS treated water at the Tokyo Electric Power Company Holdings' Fukushima Daiichi Nuclear Power Station, and the radiological impact assessment on the environment

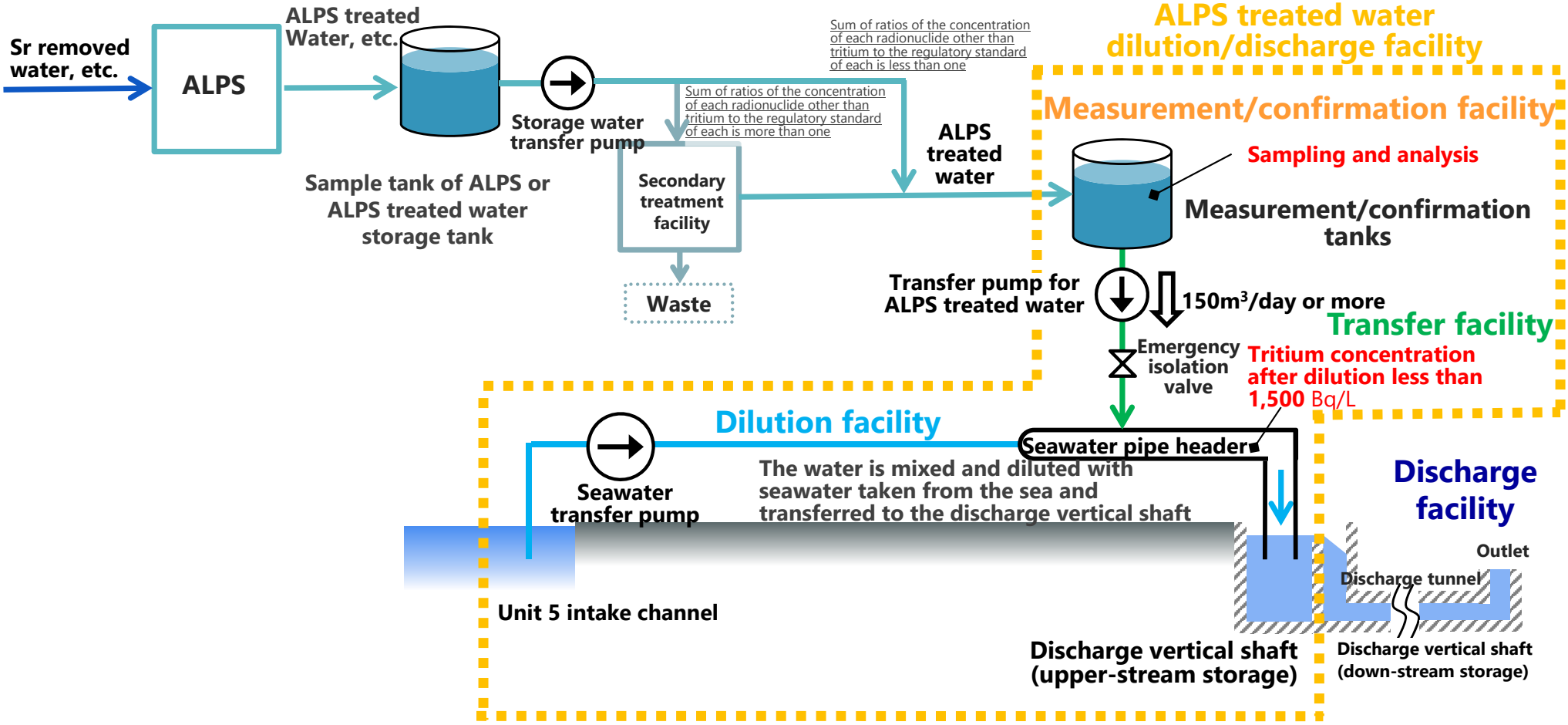
2-1. Overview of ALPS Treated Water Dilution/Discharge Facility

Objective

Water from which radioactive nuclides has been removed using ALPS until the radionuclide concentration is at a sufficiently low concentration, will be diluted with seawater and discharged into the sea after confirming that the water meets the regulatory requirements (water with the sum of ratios of legally required concentrations, excluding tritium, less than 1).

Facility overview

In the measurement/confirmation facility, once the radionuclide in the water in the measurement/confirmation tank are uniformly dispersed, samples are taken and analyzed to confirm the water meets regulatory standards. The ALPS treated water is then transferred to the seawater pipe header using the transfer facility and mixed with the seawater taken from the Unit 5 intake channel using the dilution facility until the tritium concentration is below 1,500 Bq/L. This is then discharged using the discharge facility.

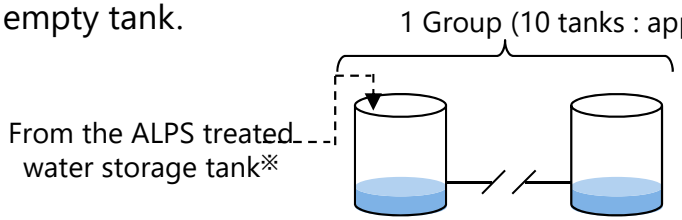


2-2. ALPS Treated Water Dilution/Discharge Facility (Measurement/Confirmation Facility)

- Measurement/confirmation facility
  - K4 area tanks (total : approx. 30,000 m³) will be co-opted as measurement and confirmation tanks. 10 tanks of each will be taken from groups A, B, and C (each tank has a capacity of around 1,000 m³).
  - Each tank group is charged with processes ① through ③ in rotation, and in the ② Measuring/confirmation process, water that has been made uniform through circulating and stirring will be sampled and analyzed.

①Receiving process

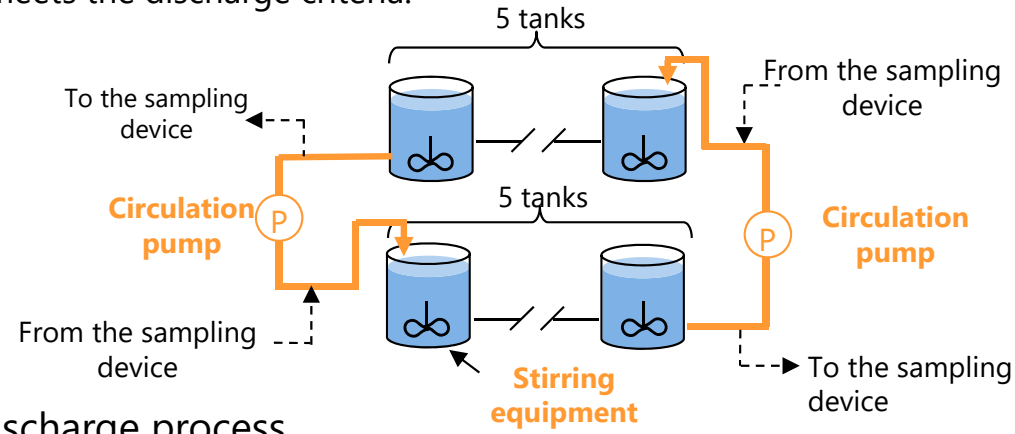
Receive ALPS treated water from the ALPS treated water storage tank into an empty tank.



※Existing transfer pipes will be used in receiving water

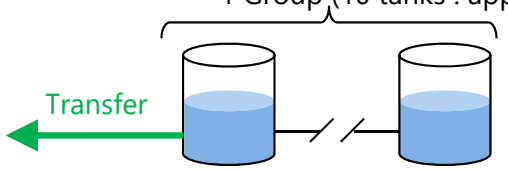
②Measuring/confirmation process

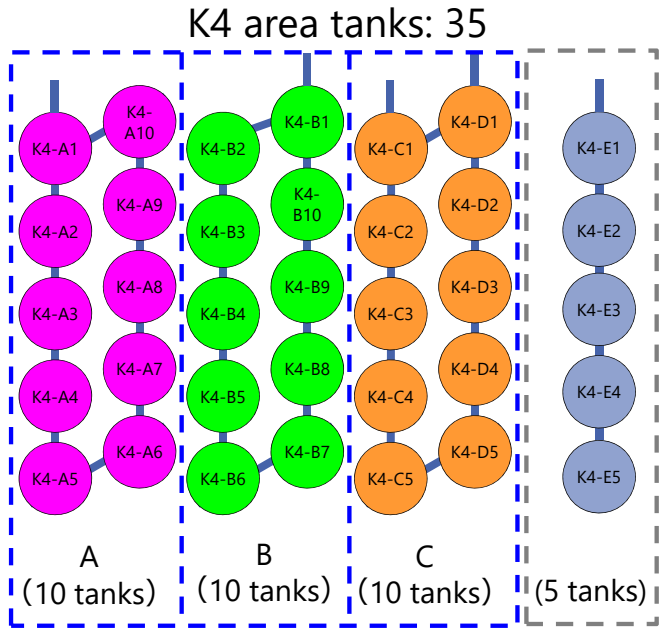
After making the quality of the water in the tanks uniform using the stirring equipment and circulation pumps, samples are taken to see if the water meets the discharge criteria.



③Discharge process

After confirming the water meets the discharge criteria, the ALPS treated water is transferred via the transfer facility to the dilution facility.





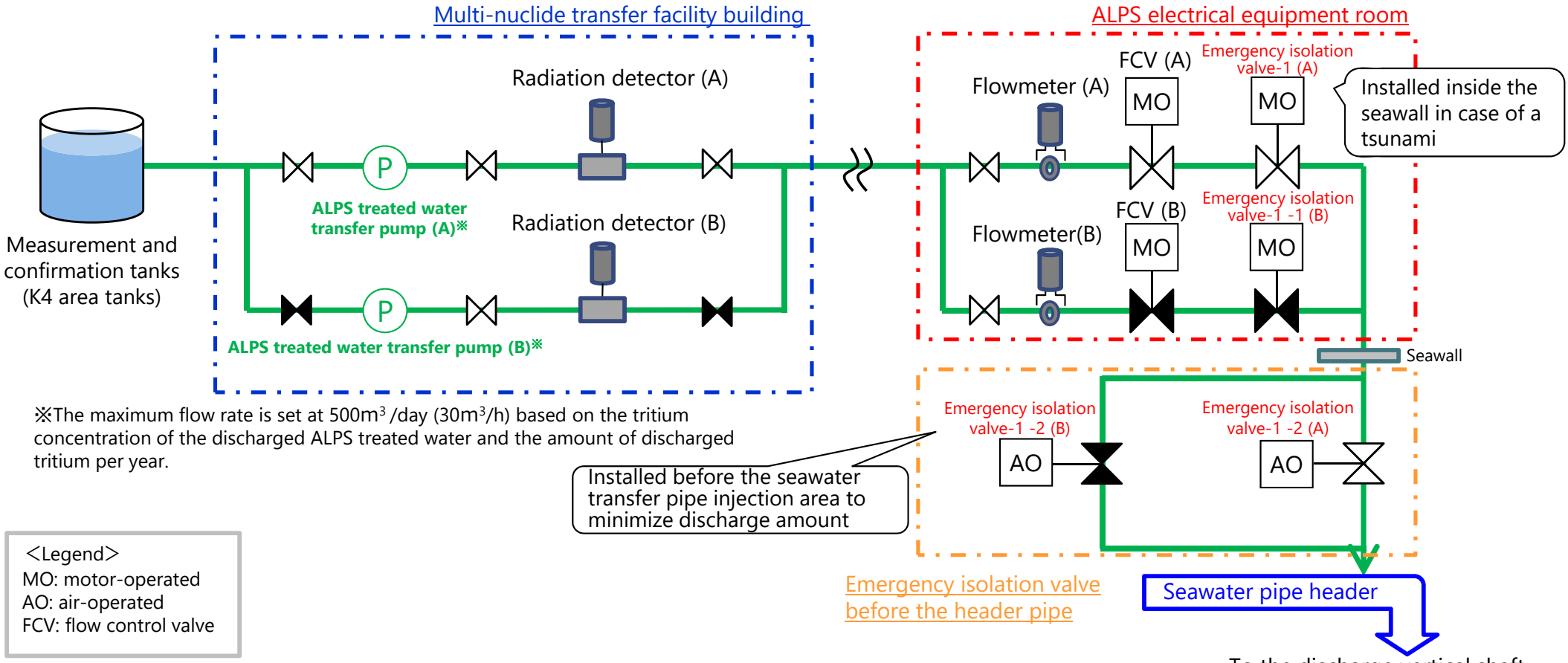
2.50 ALPS treated water dilution/discharge facility

2.5 Multi-nuclide treated water storage tanks

	A	B	C
1st round	Receiving	—	—
2nd round	Measurement and confirmation	Receiving	—
3rd round	Discharge	Measurement and confirmation	Receiving
4th round	Receiving	Discharge	Measurement and confirmation
…	Measurement and confirmation	Receiving	Discharge

2-3. ALPS Treated Water Dilution/Discharge Facility (Transfer Facility)

- Transfer facility
  - The transfer facility is comprised of the ALPS treated water transfer pumps and transfer pipes.
  - ALPS treated water transfer pump is comprised of two units, the operating unit and the reserve. It transfers the ALPS treated water from the measurement and confirmation tank to the dilution facility.
  - Two emergency isolation valves will be installed, one before the seawater pipe header to be able to stop transfer swiftly in an emergency and another inside the seawall, as a tsunami measure.

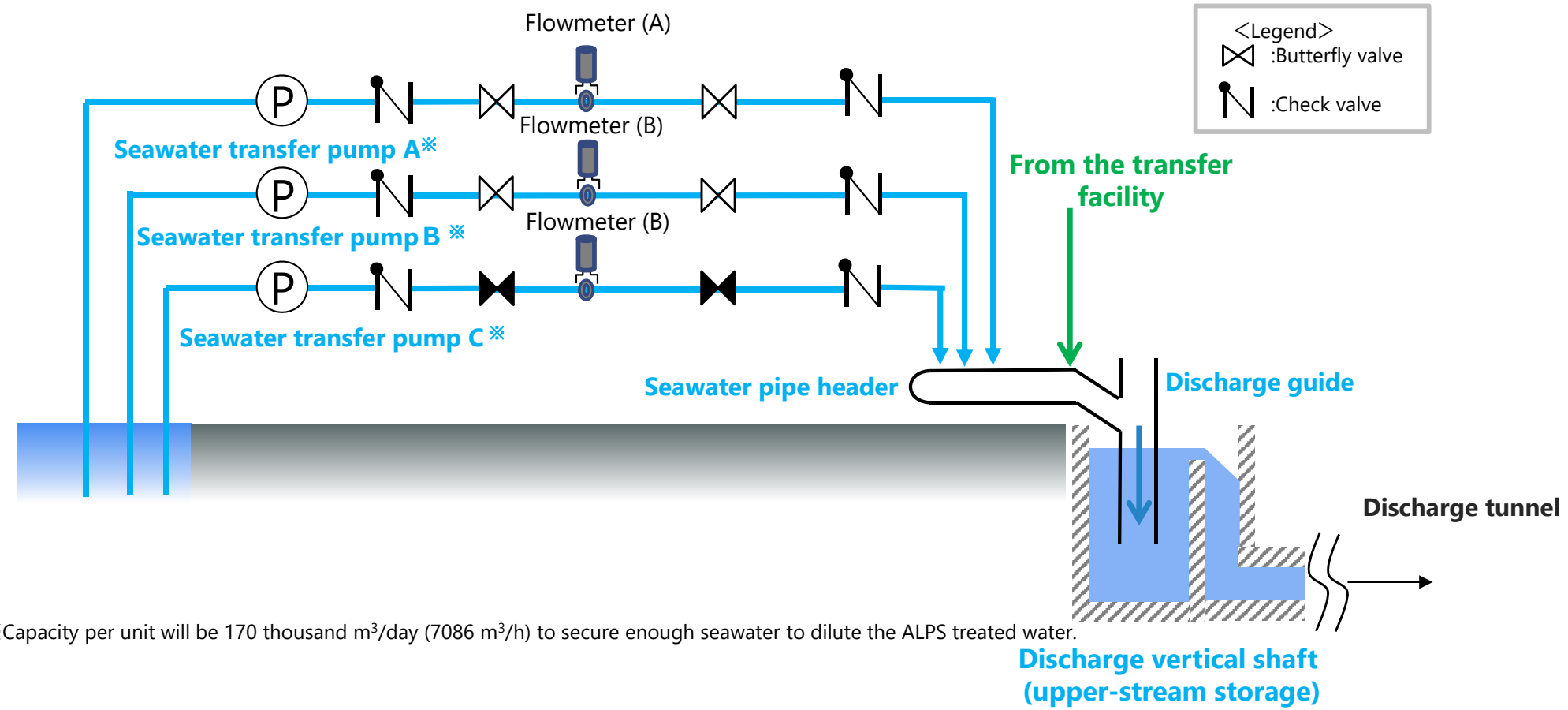


※The maximum flow rate is set at 500m^3 /day (30m^3/h) based on the tritium concentration of the discharged ALPS treated water and the amount of discharged tritium per year.

<Legend>
MO: motor-operated
AO: air-operated
FCV: flow control valve

2-4. ALPS Treated Water Dilution and Discharge Facility (Dilution Facility)

- Dilution facility
  - The dilution facility is comprised of the seawater transfer pump, seawater pipe (including header pipe), discharge guide, and discharge vertical shaft (upper-stream storage). It will dilute ALPS treated water using sweater and then transfer the diluted water to the discharge vertical shaft (upper-stream storage), and to the discharge facility.
  - The seawater transfer pump will have a capacity that allows ALPS treated water transferred using the transfer facility to be diluted by more than 100 times.



※Capacity per unit will be 170 thousand m^3/day (7086 m^3/h) to secure enough seawater to dilute the ALPS treated water.

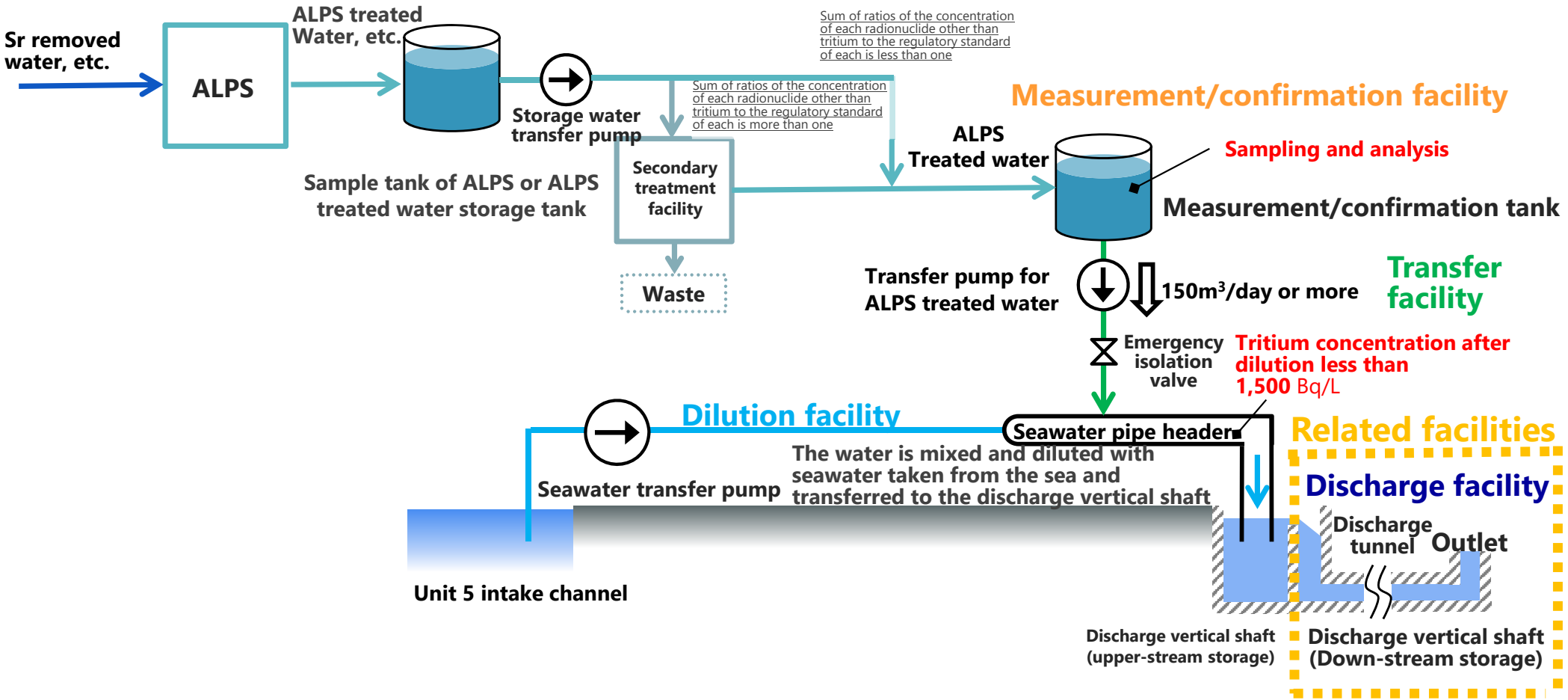
3-1. Objective and facility overview of related facilities (Discharge Facility)

Objective

To discharge the water that is released from the ALPS treated water dilution/discharge facility (water diluted by seawater and has been confirmed to be sum of ratios of legally required concentrations, including tritium, is less than 1) into the sea at a location 1km from the Fukushima Daiichi Nuclear Power Station.

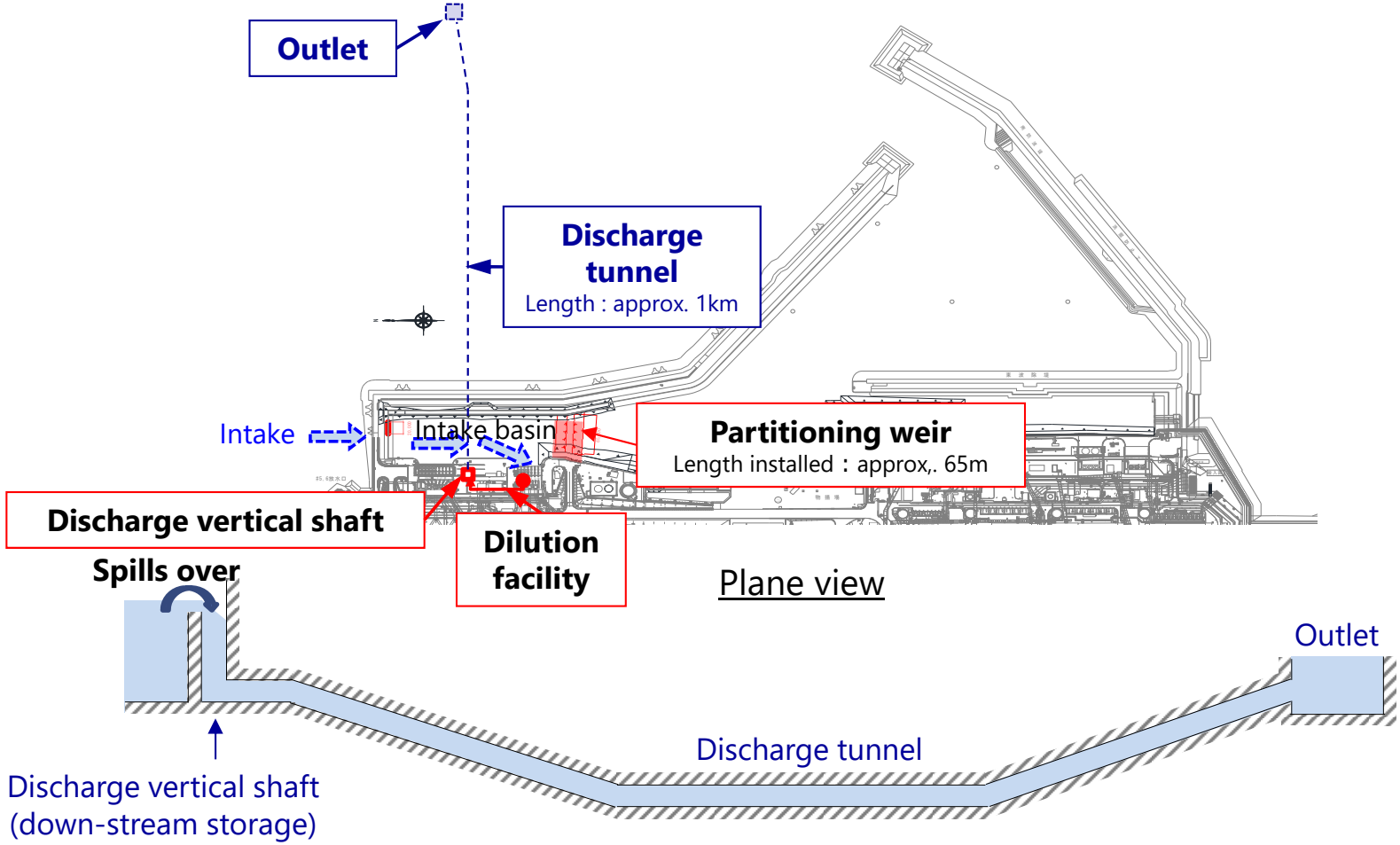
Facility overview

The discharge facility will be comprised of the discharge shaft (down-stream storage), discharge tunnel and discharge outlet to achieve the objective above.



3-2. Overview of related facilities (Discharge Facility) (1/2)

- Discharge facility
  - The discharge facility is designed so that the water that has spilled over the partition in the discharge vertical shaft will be transferred to the outlet 1 km away due to the differential head between the discharge vertical shaft (down-stream storage) and sea surface. The design will take into account friction loss and rising water levels in the discharge facility.



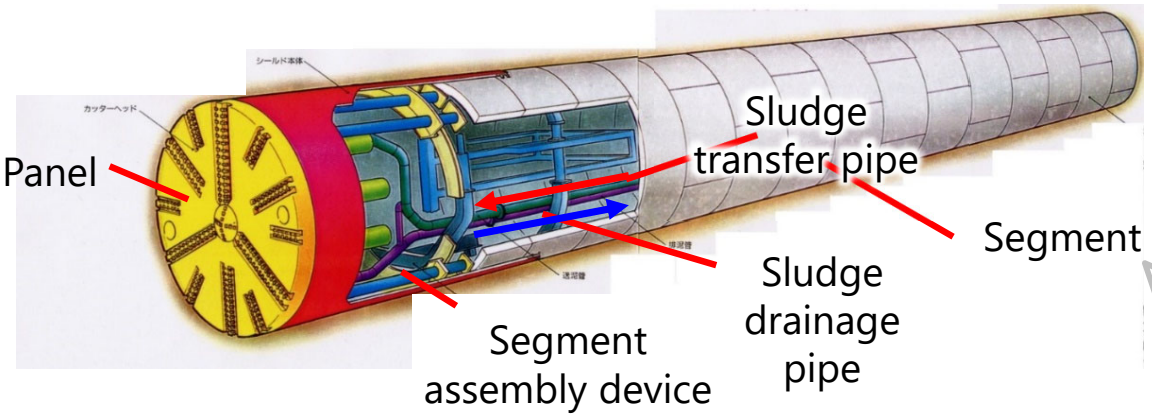
3-3. Overview of related facilities (Discharge Facility) (2/2)

Overview of structural design

- Because it goes through the rock base layer, the structure will be highly resistant against any earthquakes and the risk of water leakage will be low.
- The shield method will be used in construction. It will be made waterproof through the use of two layers of sealing material in the reinforced concrete segment.
- The tunnel structure (segment) is designed considering the effects of typhoons (high waves) and storm surges (sea level rise).

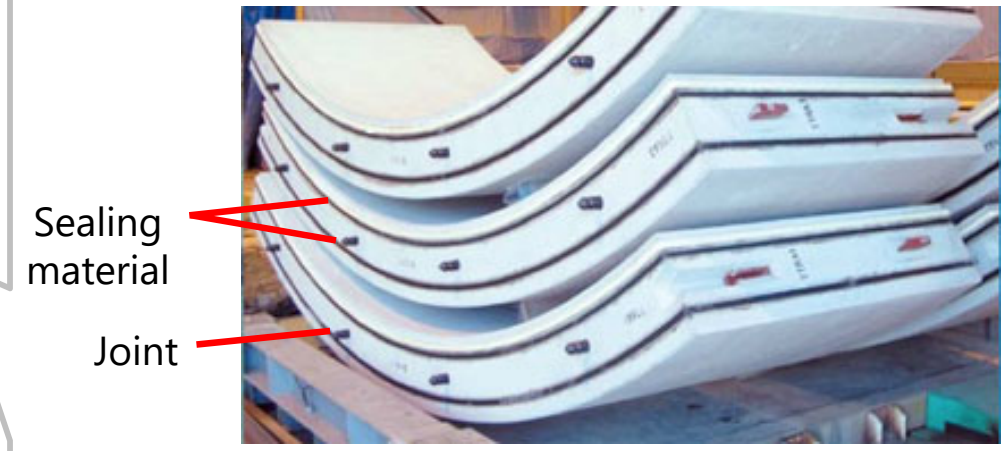
Tunneling (shield method)

- There are many examples of seabed tunnels being built using shield method and therefore the probability of any problems occurring is deemed low by secure construction work.



*The slurry shield tunneling will be used for this project

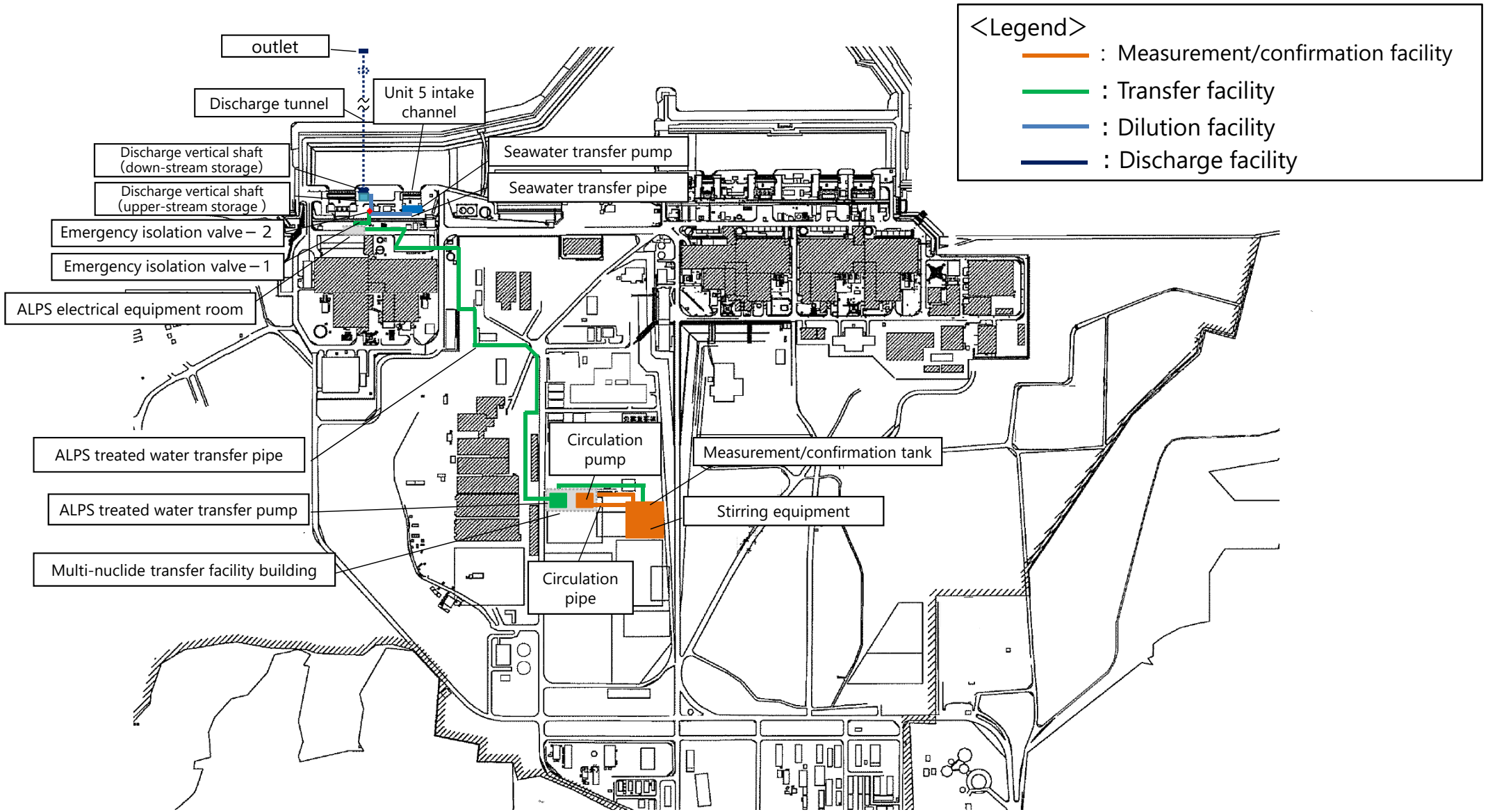
Overview of shield machine



Segment

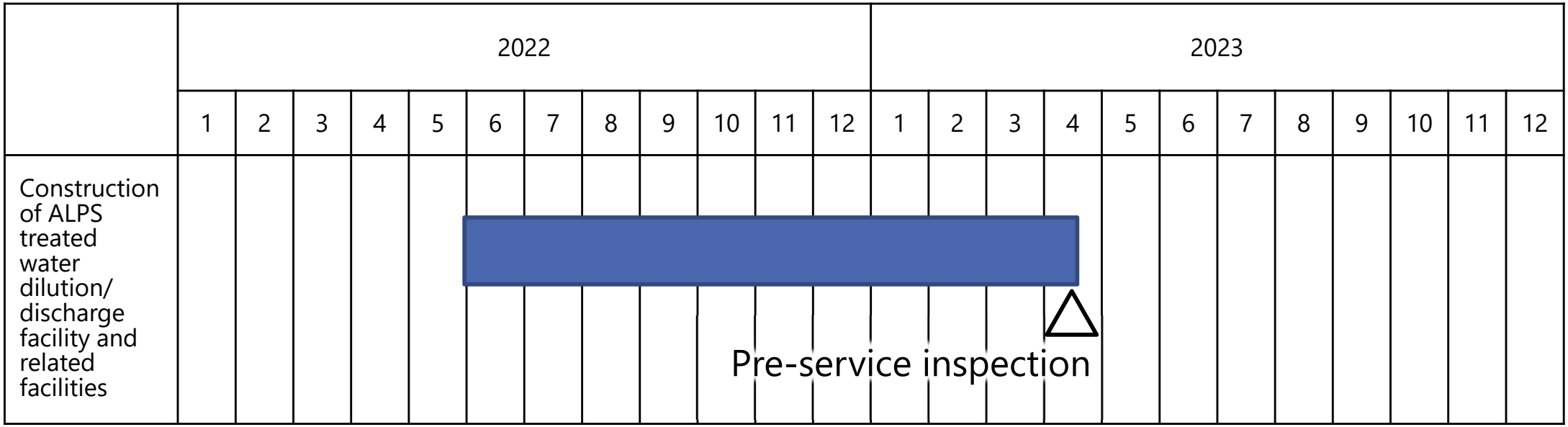
4. Site plan for the ALPS treated water dilution/discharge facility and related facilities

- The ALPS treated water dilution/discharge facility and related facilities will be located as follows.



5. Construction schedule for the ALPS treated water dilution/discharge facility and related facilities

- Subject to the approval of the Nuclear Regulation Authority (NRA), construction and assembly on the field will begin, and facilities are scheduled to be completed around mid-April 2023.



: Construction and assembly on the field

6. Supplementary explanation regarding radioactive waste management (III)

TEPCO

- Overview

  Management methods to reduce the amount of radionuclide using ALPS in treated water from the contaminated water treatment facility and treatment facility outlet water, and to dilute ALPS treated water (water that meets the criteria that the sum of ratios of legally required concentrations, excluding tritium, is less than 1) with seawater and discharge it, and assessment of the dose at the station site boundary impacted by the discharge of ALPS treated water will be explained here.

- Management method

  Samples are taken from the measurement/confirmation facility before discharge, and tritium and other radionuclide are analyzed to confirm that the water meets ALPS treated water criteria. The water is then diluted with seawater in the dilution facility to reduce the tritium concentration, and then discharged.
  - It is confirmed in measurements that the sum of ratios of legally required concentrations, excluding tritium, is less than 1 for ALPS treated water.
  - The discharge flow rate and the diluting seawater flow rate will be set so that the tritium concentration in the discharge vertical shaft (upper-stream storage) is less than 1500Bq/L and the seawater dilutes the ALPS treated water by more than 100 times.
  - The amount of tritium discharged will be less than 22 trillion Bq per year.

- Dose assessment

  The effective dose evaluation value at the site boundary due to the discharge of ALPS treated water is 0.035 mSv/year. As such, there will be no change to the effective dose evaluation value due to the discharge of radioactive liquid waste (0.22mSv/year).
  - Contributions of tritium to the dose are conservatively evaluated to be 0.025 (1500/60,000) as a ratio against the legally required concentration of 60,000 Bq/L, since it will be diluted by seawater until the dose is less than 1500 Bq/L.
  - Contributions of radioactive nuclides other than tritium are conservatively evaluated to be 0.01 (1/100) as a sum of ratios of legally required concentrations, since it will be diluted by more than 100 times with seawater after it is confirmed that the sum of ratios of legally required concentrations in the measurement/confirmation facility is less than 1.

(Reference) Overview of facilities for securing safety

Secondary treatment facility (newly installed reverse osmosis membrane facility)

Secondary treatment of Treated water to be re-purified (sum of ratios of legally required concentrations, excluding tritium, is between 1 and 10

Secondary treatment facility (ALPS)

Secondary treatment of Treated water to be re-purified (sum of ratios of legally required concentrations, excluding tritium, is 1 or higher)

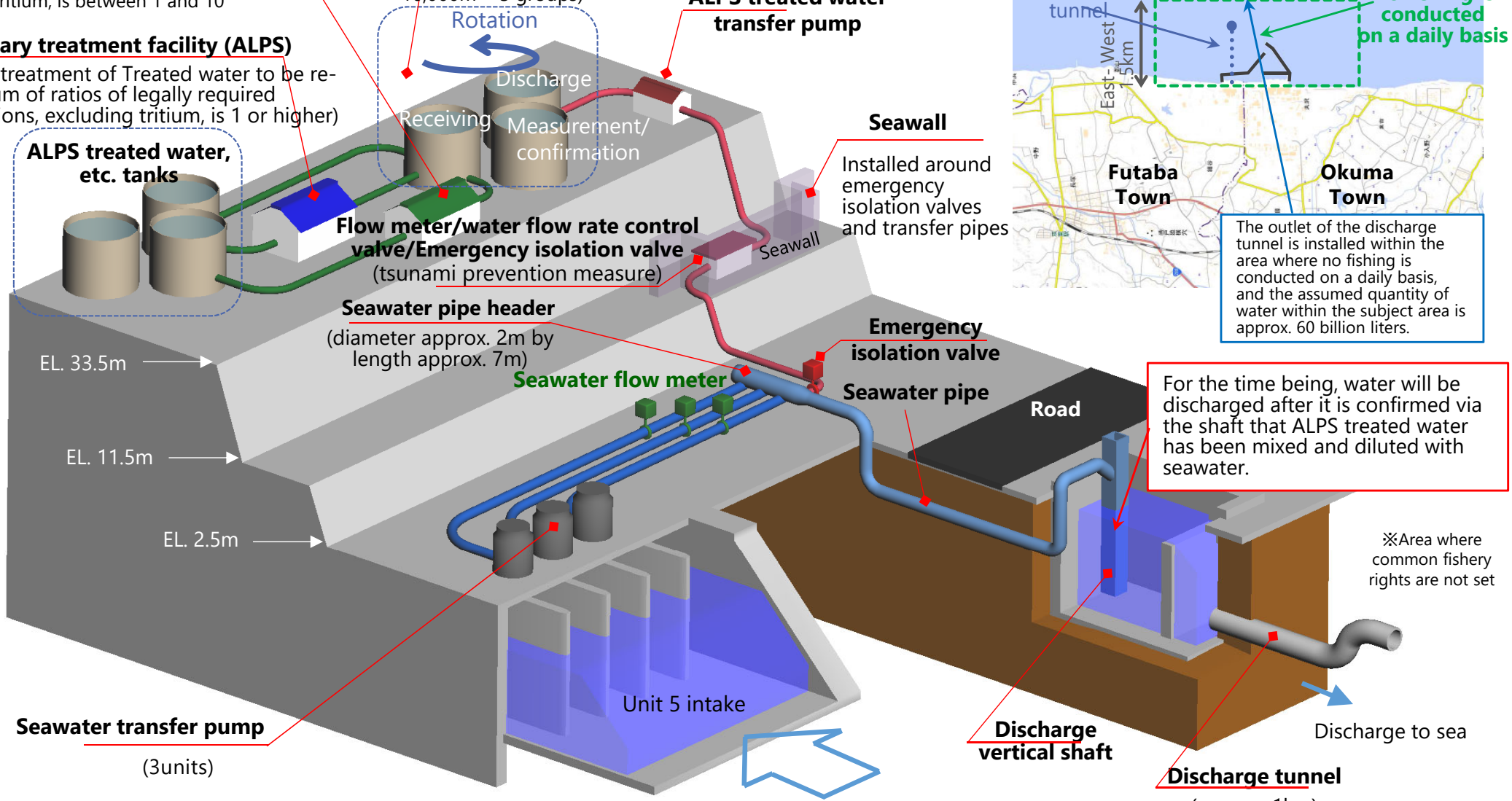
Measurement/confirmation facility (K4 tank group)

Comprised of three sets of tank groups each with the role of receiving, measurement/confirmation and discharge. In the measurement/confirmation stage, water that has been made uniform through circulation and stirring is sampled and analyzed (approx. 10,000m^3×3 groups)

ALPS treated water transfer pump

Seawall

Installed around emergency isolation valves and transfer pipes



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

The outlet of the discharge tunnel is installed within the area where no fishing is conducted on a daily basis, and the assumed quantity of water within the subject area is approx. 60 billion liters.

For the time being, water will be discharged after it is confirmed via the shaft that ALPS treated water has been mixed and diluted with seawater.

※Area where common fishery rights are not set