Situation of Storage and Treatment of Accumulated Water including Highly Concentrated Radioactive Materials at Fukushima Daiichi Nuclear Power Station (228th Release)

November 20, 2015
Tokyo Electric Power Company

1. Introduction

This document is to report the following matters in accordance with the instruction of "Installment of treatment facility and storing facility of water including highly concentrated radioactive materials at Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company (Instruction) "(NISA No. 6, June 8, 2011), dated on June 9, 2011.

<Instruction>

TEPCO should report to NISA the situation of storing and treatment of the contaminated water in the Power Station and the future forecast based upon the current situation has to be reported to NISA as soon as the treatment facility starts its operation. Also, subsequently, continued report has to be submitted to NISA once a week until the treatment of the accumulated water in the Central Radioactive Waste Treatment Facility is completed.

2. Situation of storing and treatment of accumulated water in the building (actual record)

Stored amounts in each unit building (Units 1 to 4 (including condensers and trenches)) and stored and treated amounts, and other related data in the Accumulated Water Storing Facility as of November 19 are shown in the Attachment -1.

3. Forecast of storing and treatment

(1) Short term forecast

Water transfer is planned so that the levels of the accumulated water in Units 1&2 and Units 3&4 building will be maintained around at the level of OP. 3,000, based on the stored amount in the Accumulated Water Storing Facilities and the operating situation of the radioactive material treatment equipment. Water is transferred to the Process Main Building and/or High Temperature Incinerator Building as Accumulated Water Storing Facilities.

Treatment is implemented considering the situation of storage and transfer of Accumulated Water Storing Facilities.

We assume stored amounts in each unit building (Units 1 to 4 (including condenser and trench)), and stored and treated amounts, and other related data in the Accumulated Water Storing Facilities as of November 26, as shown in Attachment -2.

(2) Middle term forecast

Regarding accumulated water in Unit 1&2 building and Unit 3&4 building, from the viewpoint of reducing the risks of discharging to the ocean and leaking into the groundwater, it is necessary to keep enough capacity for the accumulated water in the building until its level reaches OP. 4,000 and to keep the accumulated water level lower than the groundwater level. On the other hand, based on the view of limiting inflow of underwater to buildings and reducing the amount of emerged accumulated water, we are planning to transfer accumulated water keeping its level in the building around OP. 3,000 considering water tank capacity.

As for accumulated water of the Process Main Building and the High Temperature Incinerator Building, we are planning to treat the accumulated water considering the situation of construction of middle and low level waste water tanks, the operation factor of the radioactive material treatment instruments and duration for maintenance.

We forecast stored amounts in each unit building (Unit 1 to 4 (including condensers and trenches)), and storing and treatment situations in the Accumulated Water Storing Facilities for the next 3 months, as shown in Attachment -3.

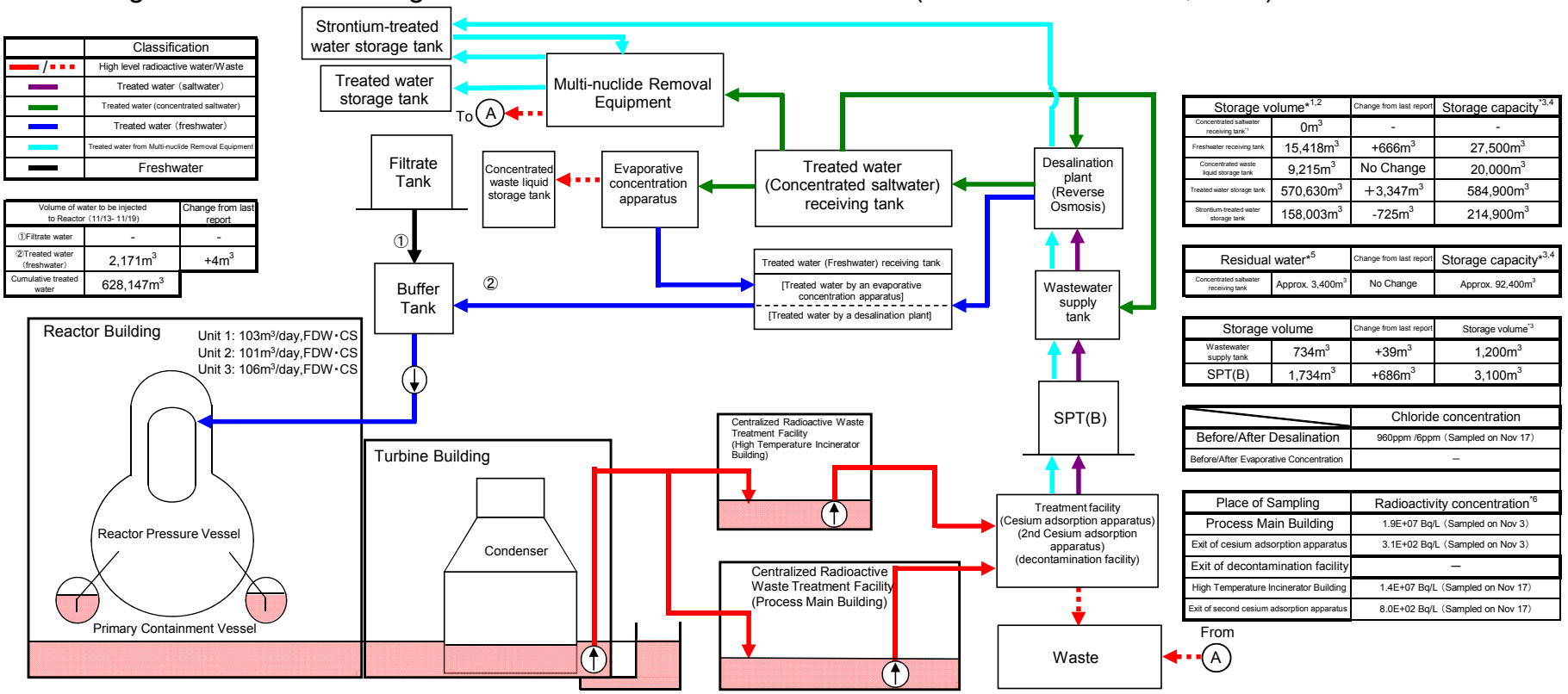
Stored amounts in each building and the water storage equipment are forecasted to be unchanged in case transfer and treatment were implemented as scheduled without rain. However, it would be subject to change depending on the operation factor of the radioactive material treatment instruments and so on.

Also, the water treated at the radioactive material treatment equipment (fresh water and condensed salt water) can be stored in the middle and low level waste water tanks.

END

Attachment-1

Storage and treatment of high level radioactive accumulated water (as of November 19, 2015)



	Classification
	High level radioactive water/Waste
	Treated water（saltwater）
	Treated water (concentrated saltwater)
	Treated water（freshwater）
	Treated water from Multi-nuclide Removal Equipment
	Freshwater

Volume of water to be injected to Reactor（11/13- 11/19）		Change from last report
①Filtrate water	-	-
②Treated water (freshwater)	2,171m³	+4m³
Cumulative treated water	628,147m³	

Storage volume*1,2		Change from last report	Storage capacity*3,4
Concentrated saltwater receiving tank*1	0m³	-	-
Freshwater receiving tank	15,418m³	+666m³	27,500m³
Concentrated waste liquid storage tank	9,215m³	No Change	20,000m³
Treated water storage tank	570,630m³	+3,347m³	584,900m³
Strontium-treated water storage tank	158,003m³	-725m³	214,900m³

Residual water*5		Change from last report	Storage capacity*3,4
Concentrated saltwater receiving tank	Approx. 3,400m³	No Change	Approx. 92,400m³

Storage volume		Change from last report	Storage volume*3
Wastewater supply tank	734m³	+39m³	1,200m³
SPT(B)	1,734m³	+686m³	3,100m³

	Chloride concentration
Before/After Desalination	960ppm /6ppm（Sampled on Nov 17）
Before/After Evaporative Concentration	–

Place of Sampling	Radioactivity concentration*6
Process Main Building	1.9E+07 Bq/L（Sampled on Nov 3）
Exit of cesium adsorption apparatus	3.1E+02 Bq/L（Sampled on Nov 3）
Exit of decontamination facility	–
High Temperature Incinerator Building	1.4E+07 Bq/L（Sampled on Nov 17）
Exit of second cesium adsorption apparatus	8.0E+02 Bq/L（Sampled on Nov 17）

Facility	Storage volume	Change from last	Water level in T/B *8
Unit 1	Approx. 12,800m³	-200m³	T.P.1,178 (OP.2,635)
Unit 2	Approx. 17,200m³	-900m³	T.P.1,603 OP.3,055
Unit 3	Approx. 17,400m³	+500m³	T.P.1,513 OP.2,950
Unit 4	Approx. 17,400m³	+500m³	T.P.1,583 OP.3,022
Total	Approx. 64,800m³		

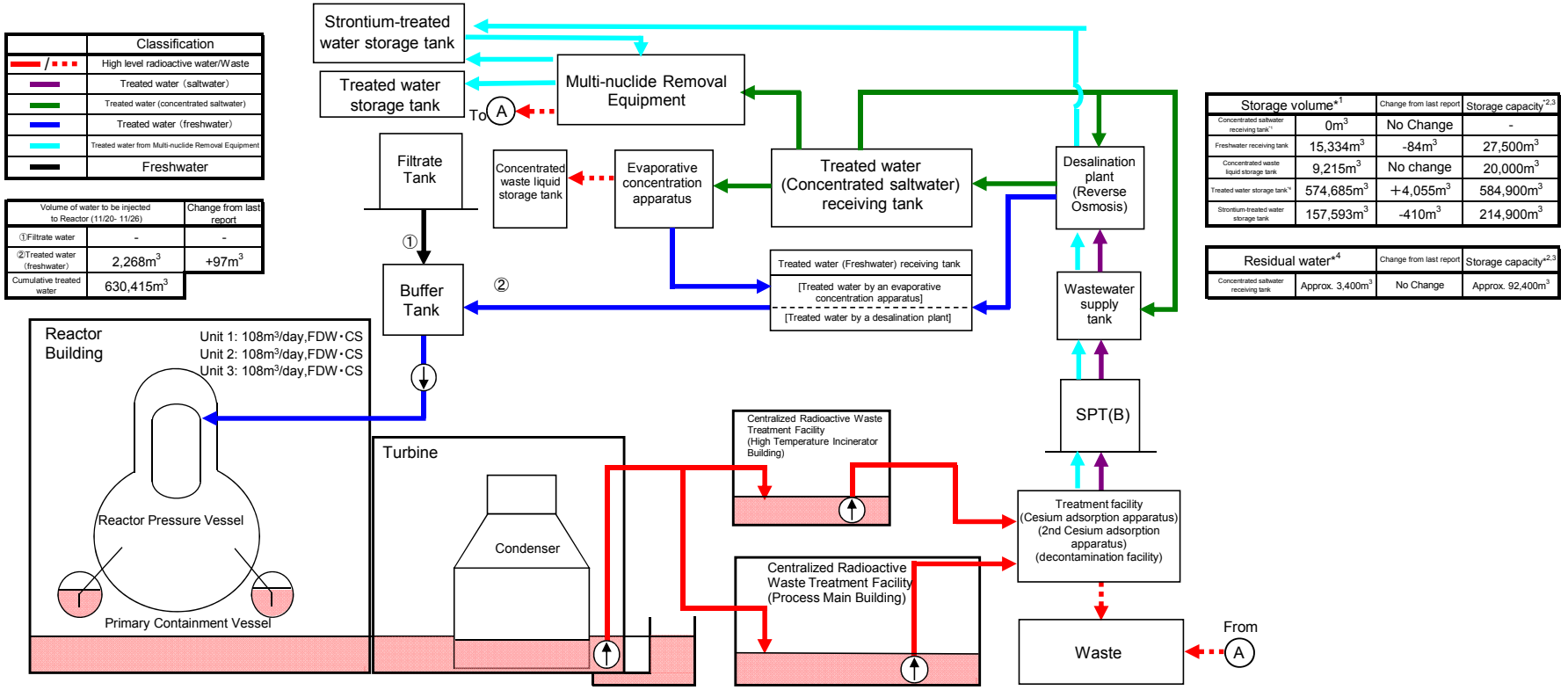
Storage Facility	Storage volume	Change from last report	Water level *8	Treated volume (11/13 -11/19)	Cumulative treated volume	Waste produced		Change from last report	Storage capacity
Process Main Building	Approx. 9,830m³	+90m³	T.P.995 (O.P. 2,357)	Approx.5,610m³ *7	Approx. 1,377,710m³ *7	Sludge	597m³	No Change	700m³ *3
High Temperature Incinerator Building	Approx. 4,020m³	+920m³	T.P.1,079 (O.P. 2,525)			Used vessels	2,877*9	+11	6,055
Total	Approx. 13,850m³								

[Main operations that have been conducted during the period from November 12, 2015 (the previous announcement data) to November 19, 2015]
- Water transfer from the Unit 1 Reactor Building to the High Temperature Incinerator Building was conducted whenever necessary.
- Water transfer from the Unit 2&3 T/Bs to the High Temperature Incinerator Building was conducted whenever necessary.
- Since Nov. 4, the operation of the Cesium Adsorption Apparatus has been suspended.
- The operation of the 2nd Cesium Adsorption Apparatus has been conducted; the availability factor has been 67% (previously assumed: 65%)
- On Nov. 12 and 13, water transfer transfer from the Unit 1 CWP pit to the Unit 4 T/B was conducted.
- On Nov. 13, water transfer from the Unit 1 Emergency Diesel Generator (B) to the Unit 1 T/B was conducted.
- On Nov. 14 and 15, water transfer from the Unit 3 Additional Underground Storage Facility for Radioactive Waste to the Unit 3 Radioactive Waste Treatment Facility was conducted.
- On Nov. 16, water transfer from the Unit 2 Additional Underground Storage Facility for Radioactive Waste to the Unit 2 Radioactive Waste Treatment Facility was conducted.
- On Nov. 15, water transfer from the Unit 1 T/B to the Unit 1 Radioactive Waste Treatment Facility was conducted.

*1 The figures of the data are treated as a reference, because water levels during water transfer are not stable.
*2 The figures of the storage volume do not include those of the following volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%:
Freshwater receiving tank (approx. 1,000m³), Concentrated waste liquid storage tank (approx.100m³),
Treated water storage tank (approx. 1,000m³), Strontium-treated water storage tank (approx. 3,000m³).
*3 The figures of the data show the operational limits.
*4 The figures of "Storage capacity" do not include those of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%. However, each tank has the capacity that accomodates more than the storage volume that accumulates up to the height of "DS."
*5 The figure of "Residual water" includes the one of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%. The amount of the residual water of concentrated saltwater is calculated based on that of the water treated through the ALPS and other facilities.
*6 The data shown here are those of Cs-137.
*7 Total treated amount of Cesium adsorption apparatus and 2nd Cesium adsorption apparatus
Breakdown of the treated amount: Cesium adsorption apparatus (0m³)
2nd Cesium adsorption apparatus (5,610m³)
Breakdown of the cumulative treated amount: Cesium adsorption apparatus (312,850m³)
2nd Cesium adsorption apparatus (1,064,860m³)
*8 The data of the water levels in the Reactor Buildings are the data as of 7 a.m., November 19.
*9 Breakdown of the used vessels: Cesium adsorption apparatus (682)
2nd cesium Cesium adsorption apparatus (150) Others: Storage container (1,801), Treated column (7) ,Used vessel (172), Filiters and so forth (65)

Attachment-2

Storage and treatment of high level radioactive accumulated water (as of November 26, 2015)



Volume of water to be injected to Reactor (11/20- 11/26)		Change from last report
①Filtrate water	-	-
②Treated water (freshwater)	2,268m³	+97m³
Cumulative treated water	630,415m³	

Storage volume*1		Change from last report	Storage capacity*2,3
Concentrated saltwater receiving tank*1	0m³	No Change	-
Freshwater receiving tank	15,334m³	-84m³	27,500m³
Concentrated waste liquid storage tank	9,215m³	No change	20,000m³
Treated water storage tank*5	574,685m³	+4,055m³	584,900m³
Strontium-treated water storage tank	157,593m³	-410m³	214,900m³

Residual water*4		Change from last report	Storage capacity*2,3
Concentrated saltwater receiving tank	Approx. 3,400m³	No Change	Approx. 92,400m³

Facility	Storage volume	Change from last	Water level in T/B
Unit 1	Approx. 12,800m³	No Change	T.P. 1,532 (O.P. 2,984) (Unit 2 T/B)
Unit 2	Approx. 16,700m³	-500m³	
Unit 3	Approx. 17,300m³	-100m³	T.P. 1,502 (O.P. 2,939) (Unit 3 T/B)
Unit 4	Approx. 17,000m³	-400m³	
Total	Approx. 63,800m³		

Storage Facility	Storage volume	Change from last report	Water level	Treated volume (11/20 - 11/26)	Cumulative treated volume	Waste produced		Change from last report	Storage capacity
Process Main Building	Approx. 11,980m³	+2,150m³	T.P. 1,605 (O.P. 2,967)	Approx.5,460m³ *5	Approx. 1,383,170m³ *5	Sludge	597m³	No Change	700m³ *2
High Temperature Incinerator Building	Approx. 3,490m³	-530m³	T.P. 638 (O.P. 2,084)			Used vessels	2,890*6	+13	6,055
Total	Approx. 15,470m³								

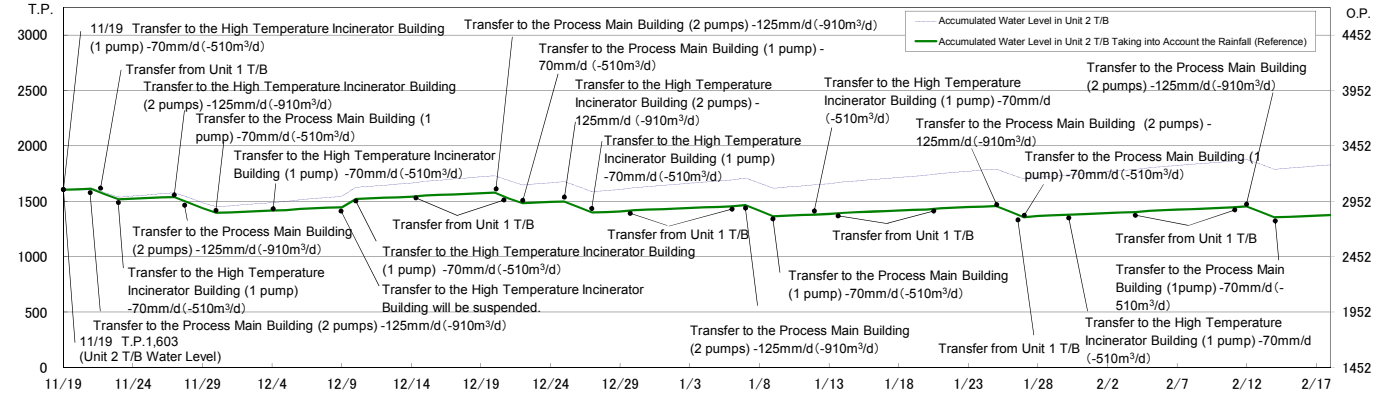
[Main operations that are planned to be conducted during the period from November 19, 2015 to November 26, 2015.]
- Water transfer from the Unit 1 Reactor Building to the High Temperature Incinerator Building will be conducted whenever necessary.
- Water transfer from the Unit 2 T/B to the High Temperature Incinerator Building and the Process Main Building will be conducted whenever necessary.
- Water transfer from the Unit 3 T/B to the High Temperature Incinerator Building will be conducted whenever necessary.
- The operation of the Cesium Adsorption Apparatus will continue to be suspended.
- The operation of the 2nd Cesium Adsorption Apparatus is scheduled (assumed Availability Factor 65%).
- Water transfer from the Unit 1 T/B to the Unit 1 Radioactive Waste Treatment Facility will be conducted.

*1 The figures of "Storage volume" do not include those of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%.
*2 The figures of the data show the operational limits.
*3 The figures of "Storage capacity" do not include those of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%. However, each tank has the capacity that accomodates more than the storage volume that accumulates up to the height of "DS."
*4 The figure of "Residual water" includes the one of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%. The amount of the residual water of concentrated saltwater is calculated based on that of the water treated through the ALPS and other facilities.
*5 Total treated amount of Cesium adsorption apparatus and 2nd Cesium adsorption apparatus
Breakdown of the treated amount: Cesium adsorption apparatus (0m³)
2nd Cesium adsorption apparatus (5,460m³)
Breakdown of the cumulative treated amount: Cesium adsorption apparatus (312,850m³)
2nd Cesium adsorption apparatus (1,070,320m³)
*6 Breakdown of the used vessels: Cesium adsorption apparatus (682)
2nd cesium Cesium adsorption apparatus (150),
Others: Storage container (1,814),
Treated column (7)
Used vessels (172) , Filters and so forth (65)

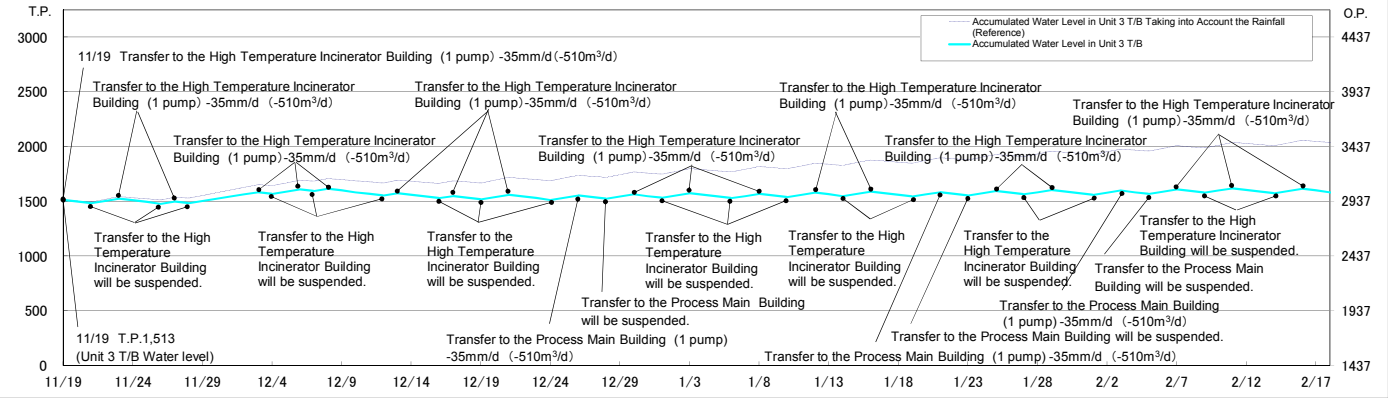
Simulation Results of Accumulated Water Treatment in Units 1-4 T/B

Attachment-3

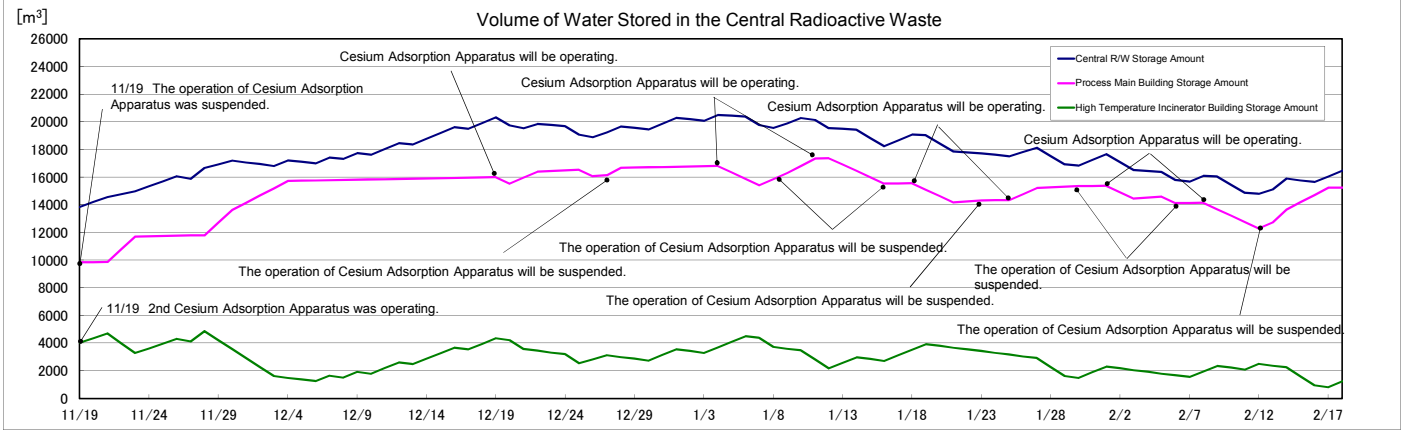
Accumulated Water Level in Unit 2 T/B [mm] (Units1-2 Connected)



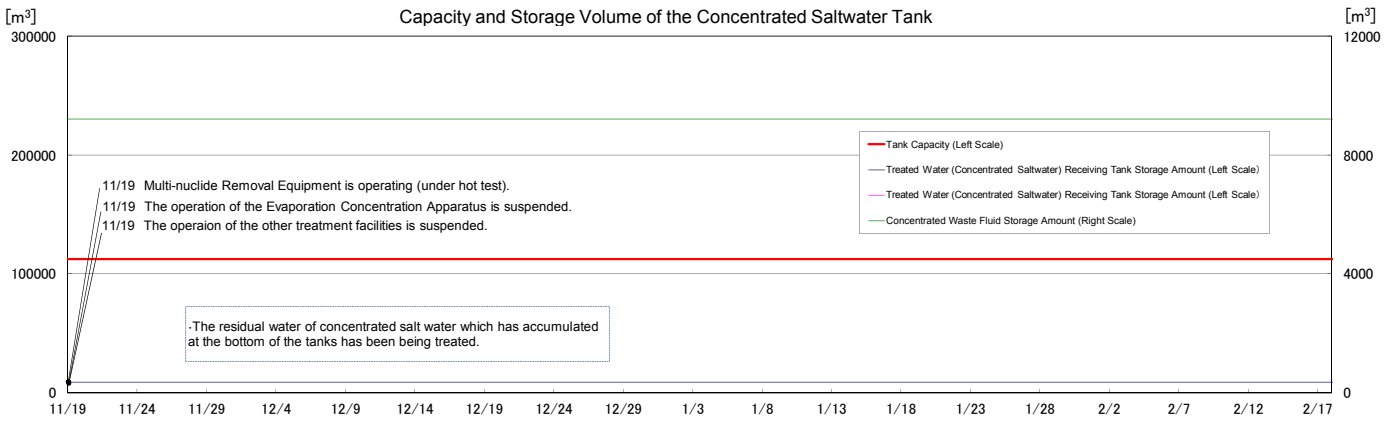
Accumulated Water Level in Unit 3 T/B [mm] (Units 3-4 Connected)



Volume of Water Stored in the Central Radioactive Waste



Capacity and Storage Volume of the Concentrated Saltwater Tank



Note

- The amount of water treated with the 2nd Cesium Adsorption Apparatus is estimated to be 780m³/d (Subject to change depending on the factors such as the levels of water accumulated in T/Bs.)
- "Accumulated Water Levels in Unit 2 and 3 T/Bs" are simulated water levels in consideration of the change of the water levels caused by recent rainfall, inflow of groundwater, etc. in the surrounding areas of the Fukushima Daiichi Nuclear Power Station.
- "Accumulated Water Levels in Unit 2 and 3 T/Bs Taking into Account the Rainfall" are simulated water levels which are calculated by adding to the accumulated water water amounts which are assumed to increase at the rate