Situation of Storage and Treatment of Accumulated Water including Highly Concentrated Radioactive Materials at Fukushima Daiichi Nuclear Power Station (329th Release)

November 20, 2017

Tokyo Electric Power Company Holdings, Inc.

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 16, 2017 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 and 2 and Units 3 and 4 building will be maintained around at the level of TP. 1,564, 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 state 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 23, 2017, as shown in Attachment -2.

(2) Middle term forecast

Regarding accumulated water in Units 1 and 2 buildings and Units 3 and 4 buildings, 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 TP. 2,564 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 TP. 1,564 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 (Units 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.

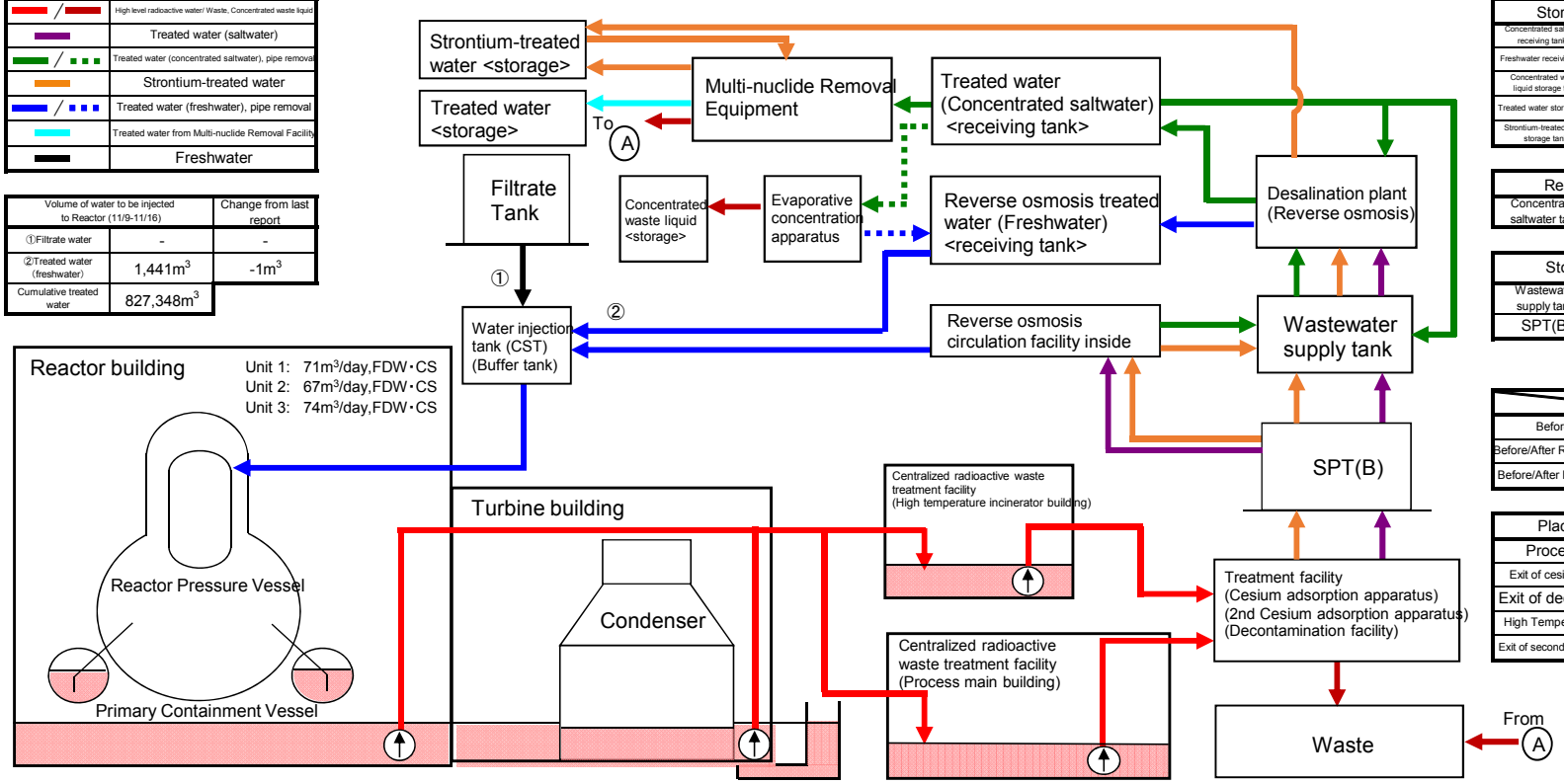
END

Attachment-1

Storage and treatment of high level radioactive accumulated water (as of November 16, 2017)

Classification
High level radioactive water/ Waste, Concentrated waste liquid
Treated water (saltwater)
Treated water (concentrated saltwater), pipe removal
Strontium-treated water
Treated water (freshwater), pipe removal
Treated water from Multi-nuclide Removal Facility
Freshwater

Volume of water to be injected to Reactor (11/9-11/16)		Change from last report
①Filtrate water	-	-
②Treated water (freshwater)	1,441m^3	-1m^3
Cumulative treated water	827,348m^3	



Storage volume*1,2		Change from last report	Storage capacity*3,4
Concentrated saltwater receiving tank*1	0m^3	-	-
Freshwater receiving tank	10,446m^3	+503m^3	12,600m^3
Concentrated waste liquid storage tank	9,264m^3	No Change	10,700m^3
Treated water storage tank	832,635m^3	+1,680m^3	850,300m^3
Strontium-treated water storage tank	185,848m^3	+1,057m^3	207,200m^3

Residual water*5		Change from last report	Storage capacity*3,4
Concentrated saltwater tank	Approx. 700m^3	No Change	Approx.5,200m^3

Storage volume		Change from last report	Storage volume*3
Wastewater supply tank	797m^3	+86m^3	1,200m^3
SPT(B)	2,241m^3	+363m^3	3,100m^3

	Chloride concentration
Before/After Desalination	280ppm/<1ppm (Sampled on October 10)
Before/After Reverse Osmosis Circulation	280ppm/2ppm (Sampled on August 17)
Before/After Evaporative Concentration	–

Place of Sampling	Radioactivity concentration*6
Process Main Building	9.1E+07 Bq/L (Sampled on November 7)
Exit of cesium adsorption apparatus	7.6E+02 Bq/L (Sampled on September 4)
Exit of decontamination facility	–
High Temperature Incinerator Building	1.9E+07 Bq/L (Sampled on March 7)
Exit of second cesium adsorption apparatus	4.4E+02 Bq/L (Sampled on November 7)

Facility	Storage volume	Change from last report	Water level in T/B *8
Unit 1	Approx. 6,000m^3	-10m^3	T.P. 443
Unit 2	Approx. 12,710m^3	-120m^3	T.P.905
Unit 3	Approx. 12,630m^3	-90m3	T.P. 748
Unit 4	Approx. 13,550m^3	-180m3	T.P. 845
Total	Approx. 44,890m^3		

Storage facility	Storage volume	Change from last report	Water level *8	Treated volume (11/9-11/16)	Cumulative treated volume	Waste produced		Change from last report	Storage capacity
Process Main Building	Approx. 10,320m^3	-2,210m3	T.P.1,169	Approx. 5,510m^3 *7	Approx. 1,855,580m^3 *7	Sludge	597m^3	No Change	700m^3 *3
High Temperature Incinerator Building	Approx. 4,070m^3	+20m3	T.P. 1,118			Used vessels	3,827*9	+3m^3	6,368
Total	Approx. 14,390m^3								

[Main operations that have been conducted during the period from November 9, 2017 (the previous announcement data) to November 16, 2017]
- Water transfer from the Units 1-4 to the buildings (Units 1-4, Centralized radioactive waste treatment facility) and to the teatment facility was conducted whenever necessary.
- Due to other work, water transfer to the buildings (Units 1-4, Centralized radioactive waste treatment facility) was conducted whenever necessary.
- From September 12, operations of the Cesium Adsorption Apparatus has been suspended.
- Operations of the 2nd Cesium Adsorption Apparatus have been conducted; the availability factor is 66% (previously simulated: 65%).
- Storage capacity of Strontium-treated water was changed as operations of the tanks finishied.

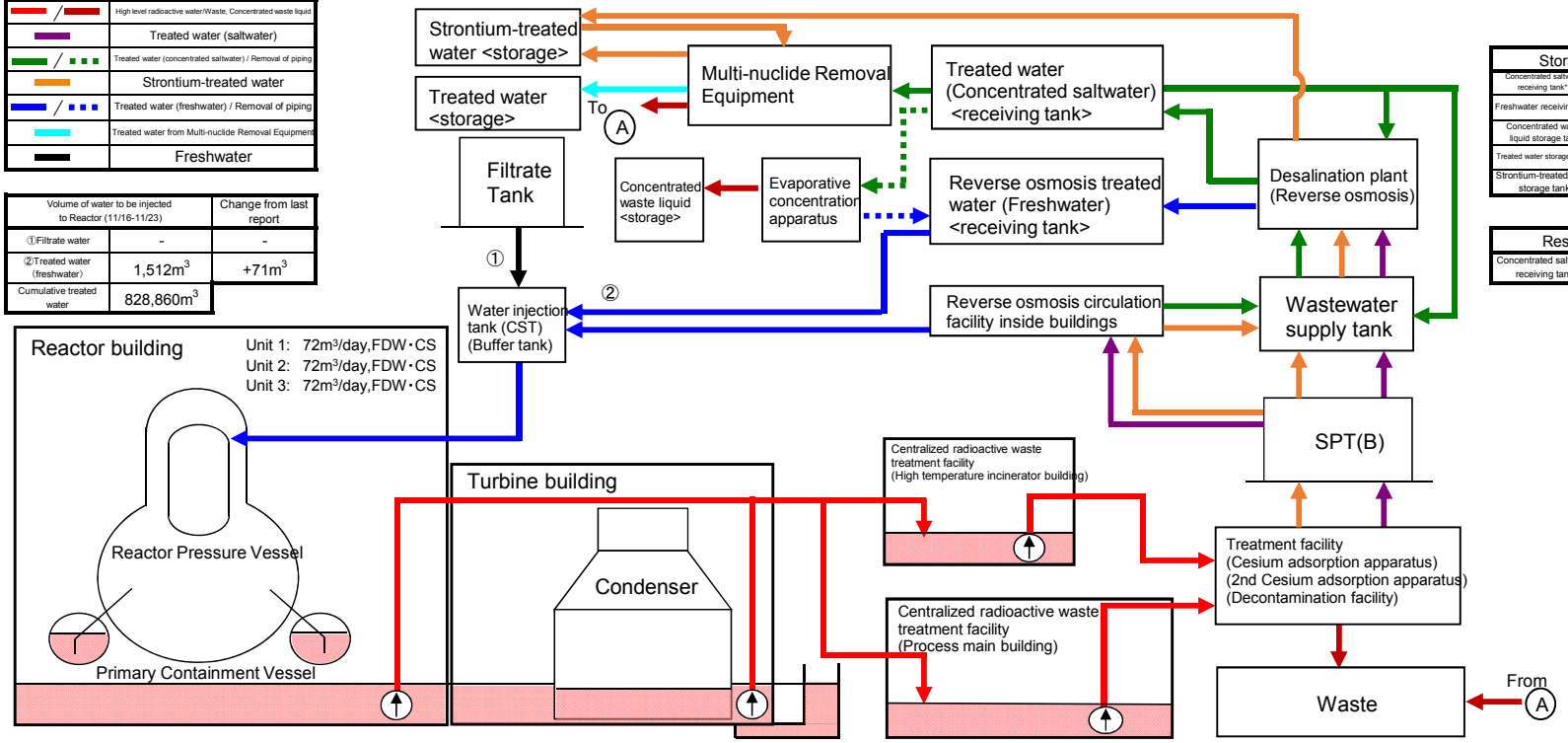
*1 The figures of the data are treated as a reference, because water levels during water transfer are not stable.
*2 The figures of the storage volume do not include those of the following volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%:
Freshwater receiving tank (approx. 900m³), Concentrated waste liquid storage tank (approx.100m³),
Treated water storage tank (approx. 1,600m³), Strontium-treated water storage tank (approx. 4,100m³).
*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 (Amount of under trial operation included.)
Breakdown of the treated amount: Cesium adsorption apparatus (0m³)
2nd Cesium adsorption apparatus (5,510m³)
Breakdown of the cumulative treated amount: Cesium adsorption apparatus (376,200m³)
2nd Cesium adsorption apparatus (1,479,380m³)
*8 The data of the water levels in the Reactor Buildings are the data as of 7 a.m., November 16.
*9 Breakdown of the used vessels: Cesium adsorption apparatus (759), 2nd Cesium adsorption apparatus (192)
Others: Storage container (2,599), Treated column (9), Used vessel (203), Filiters and so forth (65)

Attachment-2

Storage and treatment of high level radioactive accumulated water (as of November 23, 2017)

Classification	
High level radioactive water/Waste, Concentrated waste liquid	
Treated water (saltwater)	
Treated water (concentrated saltwater) / Removal of piping	
Strontium-treated water	
Treated water (freshwater) / Removal of piping	
Treated water from Multi-nuclide Removal Equipment	
Freshwater	

Volume of water to be injected to Reactor (11/16-11/23)		Change from last report
①Filtrate water	-	-
②Treated water (freshwater)	1,512m³	+71m³
Cumulative treated water	828,860m³	



Storage volume *1		Change from last report	Storage capacity *2,3
Concentrated saltwater receiving tank*1	0m³	-	-
Freshwater receiving tank	10,375m³	-71m³	12,600m³
Concentrated waste liquid storage tank	9,264m³	No Change	10,700m³
Treated water storage tank*4	835,061m³	+2,426m³	850,300m³
Strontium-treated water storage tank	185,982m³	+134m³	207,200m³

Residual water *4		Change from last report	Storage capacity *2,3
Concentrated saltwater receiving tank	Approx.700m³	No Change	Approx. 5,200m³

Facility	Storage volume	Change from last report	Water level in T/B
Unit 1	Approx. 6,040m³	+40m³	T.P. 917 (Unit 2 T/B)
Unit 2	Approx. 12,800m³	+90m³	
Unit 3	Approx. 12,710m³	+80m³	T.P. 755 (Unit 3 T/B)
Unit 4	Approx. 13,650m³	+100m³	
Total	Approx. 45,200m³		

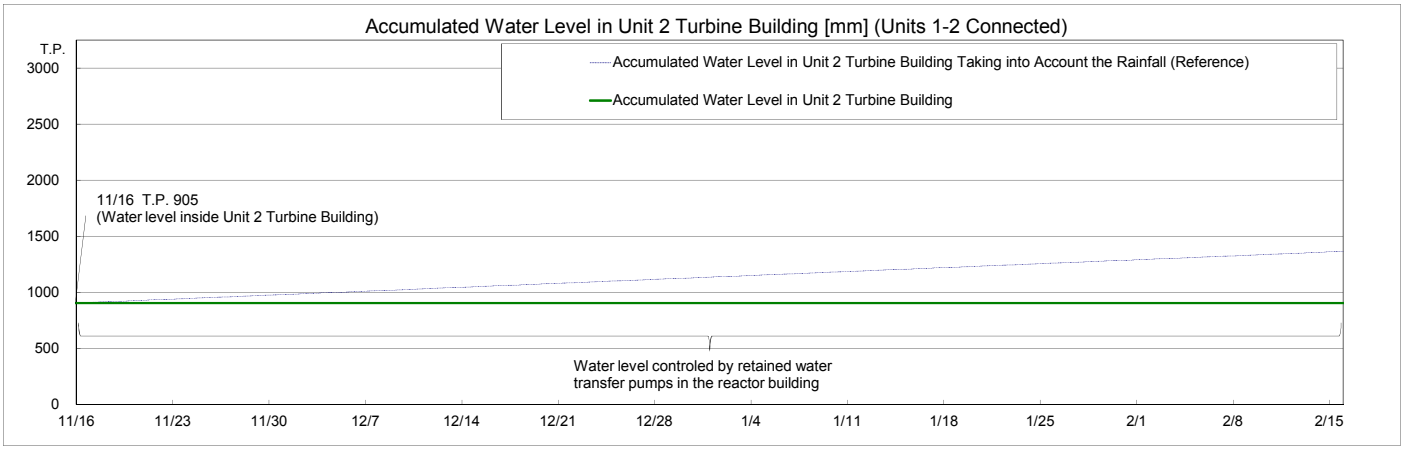
Storage Facility	Storage volume	Change from last report	Water level	Treated volume (11/16-11/23)	Cumulative treated volume
Process Main Building	Approx. 9,010m³	-1,310m³	T.P. 808	Approx. 3,780m³ *5	Approx. 1,859,930m³ *5
High Temperature Incinerator Building	Approx. 4,120m³	+50m3	T.P. 1,159		
Total	Approx. 13,130m³				

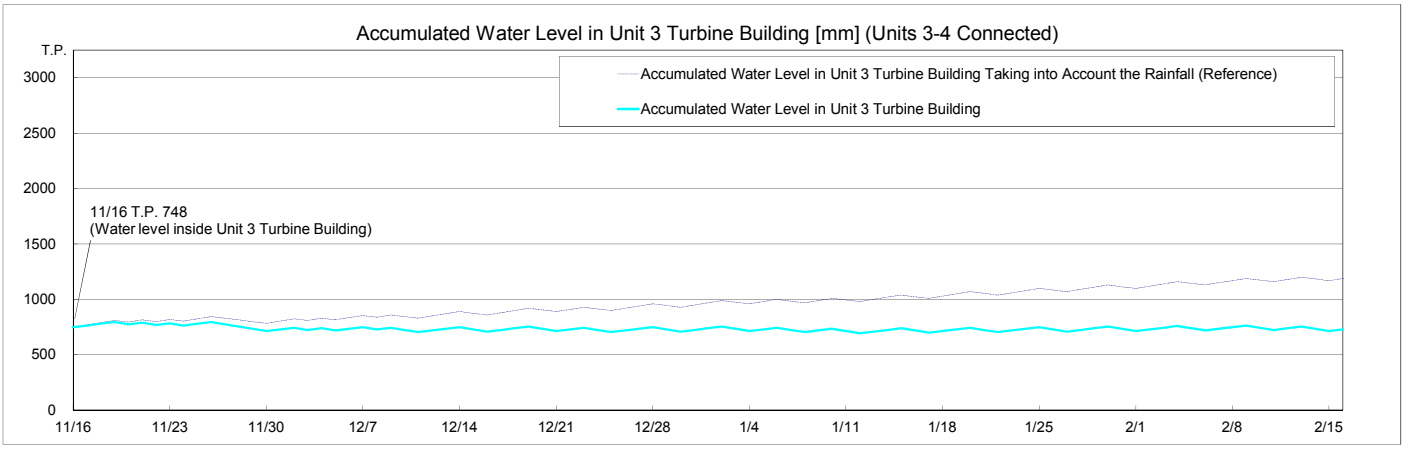
Waste produced		Change from last report	Storage capacity
Sludge	597m³	No Change	700m³ *2
Used vessels	3,832*6	+5m³	6,368

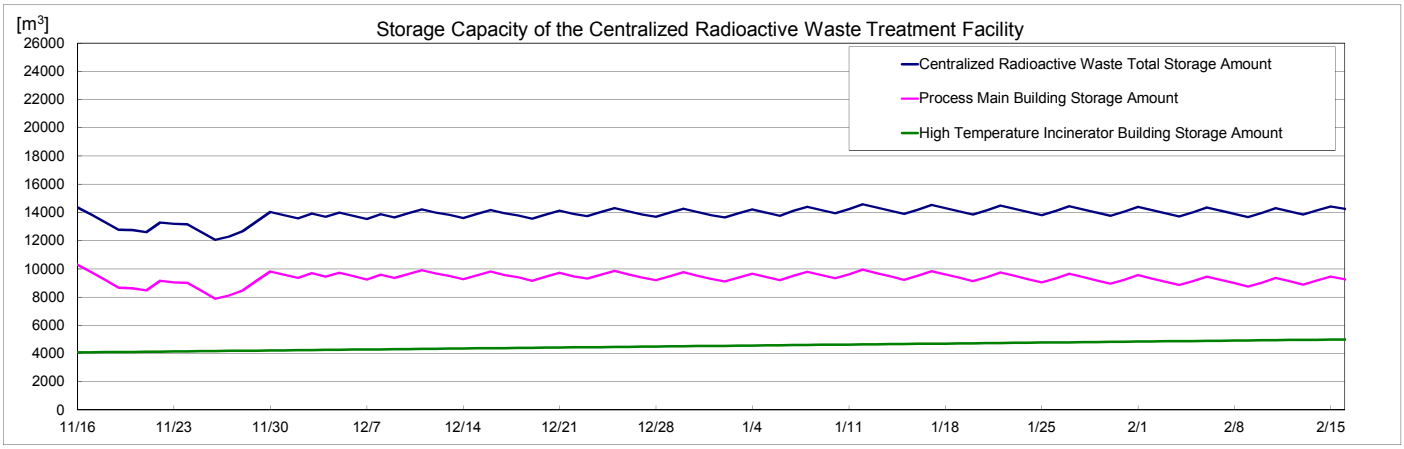
[Main operations that are planned to be conducted during the period from November 16, 2017 to November 23, 2017.]
- Water transfer from the Units 1-4 to the buildings (Units 1-4, Centralized radioactive waste treatment facility) and to the teatment facility will be conducted whenever necessary.
- Due to other work, water transfer to the buildings (Units 1-4, Centralized radioactive waste treatment facility) will be conducted whenever necessary.
- Operations of the Cesium Adsorption Apparatus will continue to be suspended.
- Operations of the 2nd Cesium Adsorption Apparatus will be conducted. (conducted previously simulated: 45%).

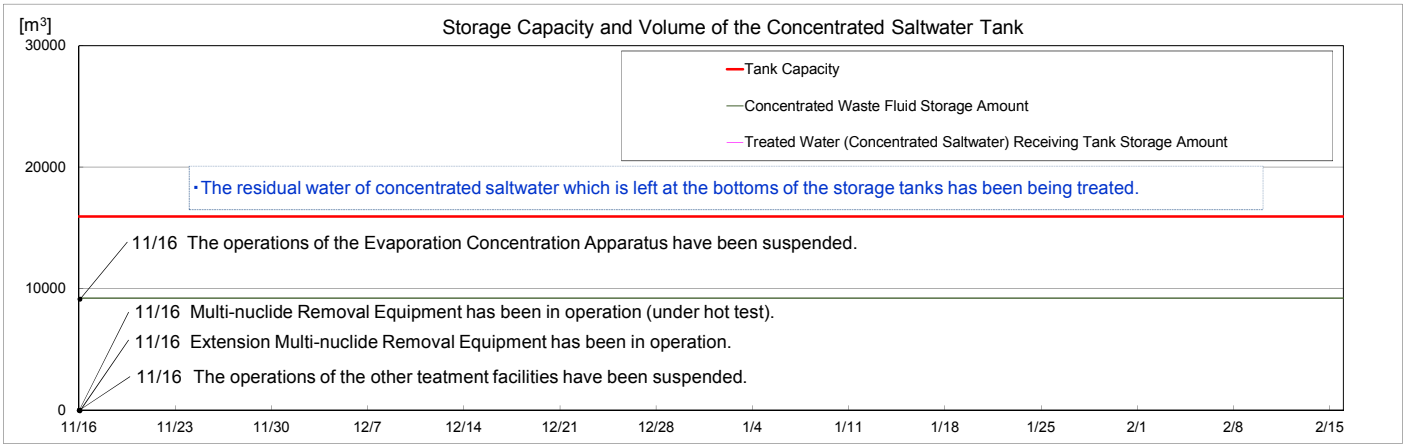
*1 The figures of "Storage volume" do not include those of the volumes that have accumulated from the bottom of the tanks to the height of so-called "down scale (DS)," where water gauges show 0%.
*2 The figures of the data show the operational limits.
*3 The figures of "Storage capacity" do not include 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 (3,780m³)
Breakdown of the cumulative treated amount: Cesium adsorption apparatus (376,200m³)
2nd Cesium adsorption apparatus (1,483,160m³)
*6 Breakdown of the used vessels: Cesium adsorption apparatus (759)
2nd Cesium adsorption apparatus (192)
Others: Storage container (2,604), Treated column (9), Used vessels (203), Filters and so forth (65)

Simulation Results of Accumulated Water Treatment in Units 1-4 Turbine









Note
- The amount of water treated through the 2nd Cesium Adsorption Apparatus is estimated to be 780m^3/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 amounts which are assumed to increase at the rate of 5mm a day when the surrounding areas of the Fukushima Daiichi Nuclear Power Station have the rainfall equal to the average amount of rain which fell for three months from August to October in 2008 to 2010.