

# **Situation of Storage and Treatment of Accumulated Water including Highly Concentrated Radioactive Materials at Fukushima Daiichi Nuclear Power Station (131<sup>st</sup> Release)**

December 25, 2013

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 future forecast based upon the current situation have 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 amount in the Accumulated Water Storing Facility (including underpass area close to the High Temperature Incinerator Building), and other related data, as of December 24, 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 amount in the Accumulated Water Storing Facilities (including underpass area close to the High Temperature Incinerator Building), and other related data as of December 31, 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 (including underpass areas close to the High Temperature Incinerator Building) for 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.

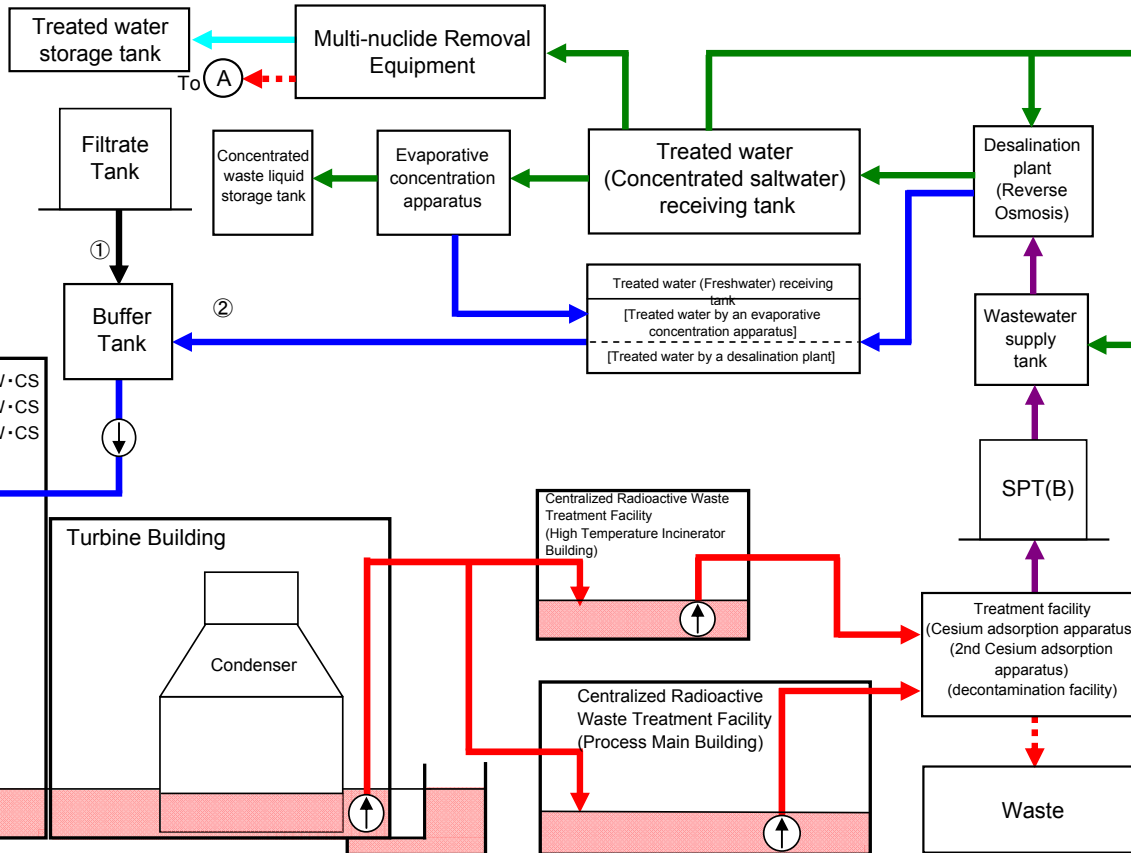
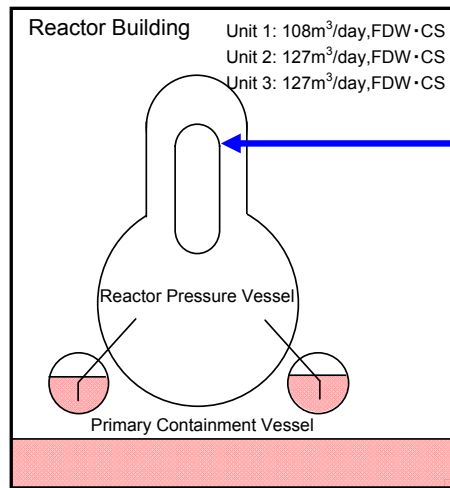
Also, the water treated at the radioactive material treatment equipment (fresh water and condensed salt water) can be stored in the middle and low level waste water tanks.

END

# Storage and treatment of high level radioactive accumulated water (as of December 24, 2013)

Classification	
<span style="color:red">■</span> / <span style="color:red">---</span> / <span style="color:red">---</span>	High level radioactive water/Waste
<span style="color:purple">■</span>	Treated water (saltwater)
<span style="color:green">■</span>	Treated water (concentrated saltwater)
<span style="color:blue">■</span>	Treated water (freshwater)
<span style="color:cyan">■</span>	Treated water from Multi-nuclide Removal Equipment
<span style="color:black">■</span>	Freshwater

Volume of water to be injected to Reactor (12/18 - 12/24)	Change from last report
① Filtrate water	-
② Treated water (freshwater)	+28m <sup>3</sup>
Cumulative treated water	407,241m <sup>3</sup>



Storage volume <sup>1</sup>	Change from last report	Storage capacity <sup>2,3</sup>
Concentrated saltwater receiving tank <sup>4</sup>	331,139m <sup>3</sup> +2,926m <sup>3</sup>	348,200m <sup>3</sup>
Freshwater receiving tank	28,410m <sup>3</sup> +276m <sup>3</sup>	31,400m <sup>3</sup>
Concentrated waste liquid storage tank	9,205m <sup>3</sup> No change	9,500m <sup>3</sup>
Treated water storage tank <sup>5</sup>	33,782m <sup>3</sup> +719m <sup>3</sup>	44,800m <sup>3</sup>

Storage volume	Change from last report	Storage volume <sup>2</sup>
Waste liquid supply tank	779m <sup>3</sup> +72m <sup>3</sup>	1,200m <sup>3</sup>
SPT(B)	1,042m <sup>3</sup> +27m <sup>3</sup>	3,100m <sup>3</sup>

Chloride concentration	
Before/After Desalination	370ppm / 1ppm (Sampled on Dec. 10)
Before/After Evaporative Concentration	6,900ppm / 2ppm (Sampled on Dec. 20, 2011)

Place of Sampling	Radioactivity density <sup>6</sup>
Process Main Building	2.5E+04 Bq/cm <sup>3</sup> (Sampled on Dec. 17)
Exit of cesium adsorption apparatus	3.4E-01 Bq/cm <sup>3</sup> (Sampled on Dec. 17)
Exit of decontamination facility	-
High Temperature Incinerator Building	2.2E+04 Bq/cm <sup>3</sup> (Sampled on Dec. 10)
Exit of second cesium adsorption apparatus	5.2E-01 Bq/cm <sup>3</sup> (Sampled on Dec. 10)

Facility	Storage volume	Change from last report	Water level in T/B
Unit 1	Approx.13,700m <sup>3</sup>	+200m <sup>3</sup>	OP.2,617
Unit 2	Approx.20,200m <sup>3</sup>	-2,000m <sup>3</sup>	OP.2,849
Unit 3	Approx.23,200m <sup>3</sup>	+1,600m <sup>3</sup>	OP.2,990
Unit 4	Approx.17,500m <sup>3</sup>	+600m <sup>3</sup>	OP.2,921
Total	Approx.74,600m <sup>3</sup>		

Storage Facility	Storage volume	Change from last report	Water level	Treated volume (12/18 - 12/24)	Cumulative treated volume	Waste produced	Change from last report	Storage capacity
Process Main Building	Approx.14,520m <sup>3</sup>	-780m <sup>3</sup>	OP.4,049	Approx. 6,280m <sup>3,7</sup>	Approx.834,040m <sup>3,7</sup>	Sludge	597m <sup>3</sup>	700m <sup>3,12</sup>
High Temperature Incinerator Building	Approx. 2,970m <sup>3</sup>	-210m <sup>3</sup>	OP.1,877			Used vessels	708 <sup>8</sup>	
Total	Approx.17,490m <sup>3</sup>							2,514

[Highlights from the previous update (December 17, 2013) to the present status]

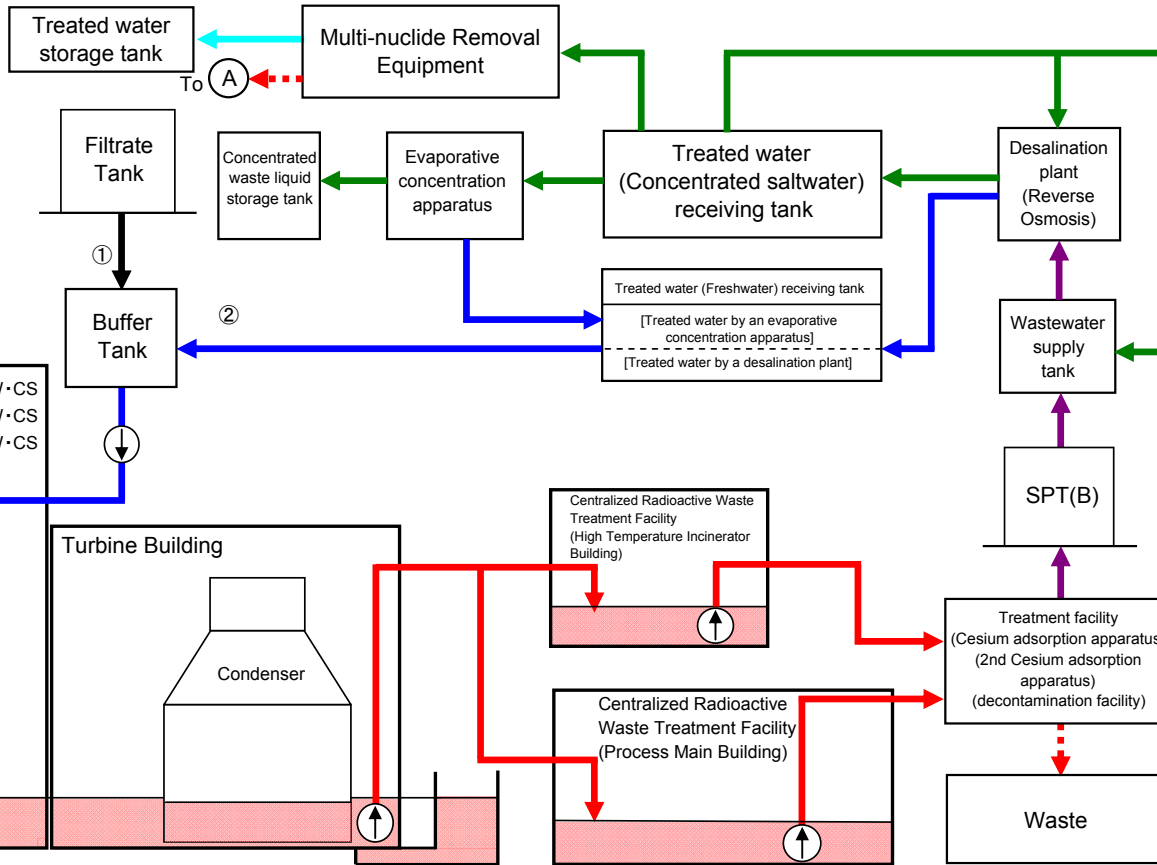
- On December 17, water transfer from Unit 2 to Unit 3 Turbine Building was restarted, and is in progress.
- On December 17, destination of water transfer from Unit 3 was switched from the Process Main Building to the High Temperature Incinerator Building, and transfer is in progress.
- Since November 29, 2012, water transfer from Unit 4 has been under suspension.
- Cesium Adsorption Apparatus and 2nd Cesium Adsorption Apparatus are under operation (Cesium Adsorption Apparatus: Availability factor 14.2% (Projected: 10%), 2nd Cesium Adsorption Apparatus: Availability factor 60.6% (Projected: 65%)).
- On December 18, operation of Cesium Adsorption Apparatus was suspended.
- On December 18, operation of 2nd Cesium Adsorption Apparatus was restarted.
- Storage capacity of the treated water storage tank was changed by operating the tanks.

<sup>1</sup> The figures are just for reference when the water level of Desalination System and Evaporative concentration apparatus are not stable.  
<sup>2</sup> Shows the operational limit.  
<sup>3</sup> The underground reservoirs are not included in the figure.  
<sup>4</sup> Storage capacity of the filtrate water tank (4,600m<sup>3</sup>) is included in the figure.  
<sup>5</sup> The treated water from the Multi-nuclide Removal Equipment (under hot test) is stored. Freshwater and concentrated saltwater will be stored depending on the operation status.  
<sup>6</sup> Data of Cs-137 are described above.  
<sup>7</sup> Total treated amount of Cesium adsorption apparatus and 2nd Cesium adsorption apparatus  
 Breakdown of the treated amount: Cesium adsorption apparatus (1,190m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (5,090m<sup>3</sup>)  
 Breakdown of the cumulative treated amount: Cesium adsorption apparatus (203,740m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (630,300m<sup>3</sup>)  
 Cesium adsorption apparatus (466)  
 2nd cesium Cesium adsorption apparatus (94)  
 Storage container of the Multi-nuclide Removal Equipment (135) and treated column (0)  
<sup>8</sup> Breakdown of the used vessels:  
 Used vessels of mobile type treatment apparatus (13, include 11 vessels used for purification of spent fuel pool)

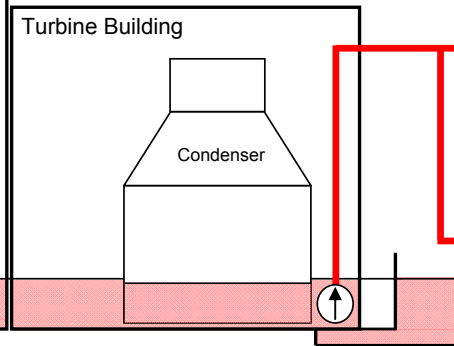
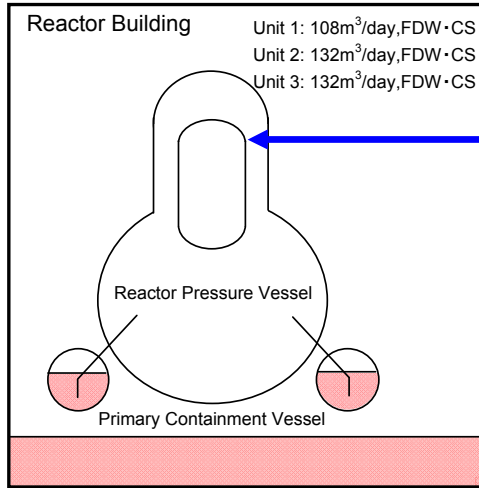
# Storage and treatment of high level radioactive accumulated water (December 31, 2013)

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 (12/25 - 12/31)	Change from last report
① Filtrate water	-
② Treated water (freshwater)	+ 65m <sup>3</sup>
Cumulative treated water	409,845m <sup>3</sup>



Storage volume	Change from last report	Storage capacity <sup>1,2</sup>
Concentrated saltwater receiving tank <sup>3</sup>	333,715m <sup>3</sup> +2,576m <sup>3</sup>	348,200m <sup>3</sup>
Freshwater receiving tank	28,158m <sup>3</sup> -252m <sup>3</sup>	31,400m <sup>3</sup>
Concentrated waste liquid storage tank	9,205m <sup>3</sup> No change	9,500m <sup>3</sup>
Treated water storage tank <sup>4</sup>	34,832m <sup>3</sup> +1,050m <sup>3</sup>	47,900m <sup>3</sup>



Facility	Storage volume	Change from last report	Water level in T/B
Unit 1	Approx. 13,900m <sup>3</sup>	+200m <sup>3</sup>	OP.3,153 (Unit 2 T/B)
Unit 2	Approx. 22,300m <sup>3</sup>	+2,100m <sup>3</sup>	(Unit 2 T/B)
Unit 3	Approx. 21,300m <sup>3</sup>	-1,900m <sup>3</sup>	OP.2,754 (Unit 3 T/B)
Unit 4	Approx. 15,900m <sup>3</sup>	-1,600m <sup>3</sup>	
Total	Approx. 73,400m <sup>3</sup>		

Storage Facility	Storage volume	Change from last report	Water level	Treated volume (12/25 - 12/31)	Cumulative treated volume	Waste produced	Change from last report	Storage capacity
Process Main Building	Approx. 14,640m <sup>3</sup>	+120m <sup>3</sup>	OP.4,103	Approx. 5,880m <sup>3</sup> *5	Approx. 839,920m <sup>3</sup> *5	Sludge	597m <sup>3</sup>	700m <sup>3</sup> *11
High Temperature Incinerator Building	Approx. 3,560m <sup>3</sup>	+590m <sup>3</sup>	OP.2,365			Used vessels	720 <sup>6</sup>	
Total	Approx. 18,200m <sup>3</sup>						+12	2,514

[Highlights from the present status (December 24, 2013) to the supposition status (December 31, 2013)]

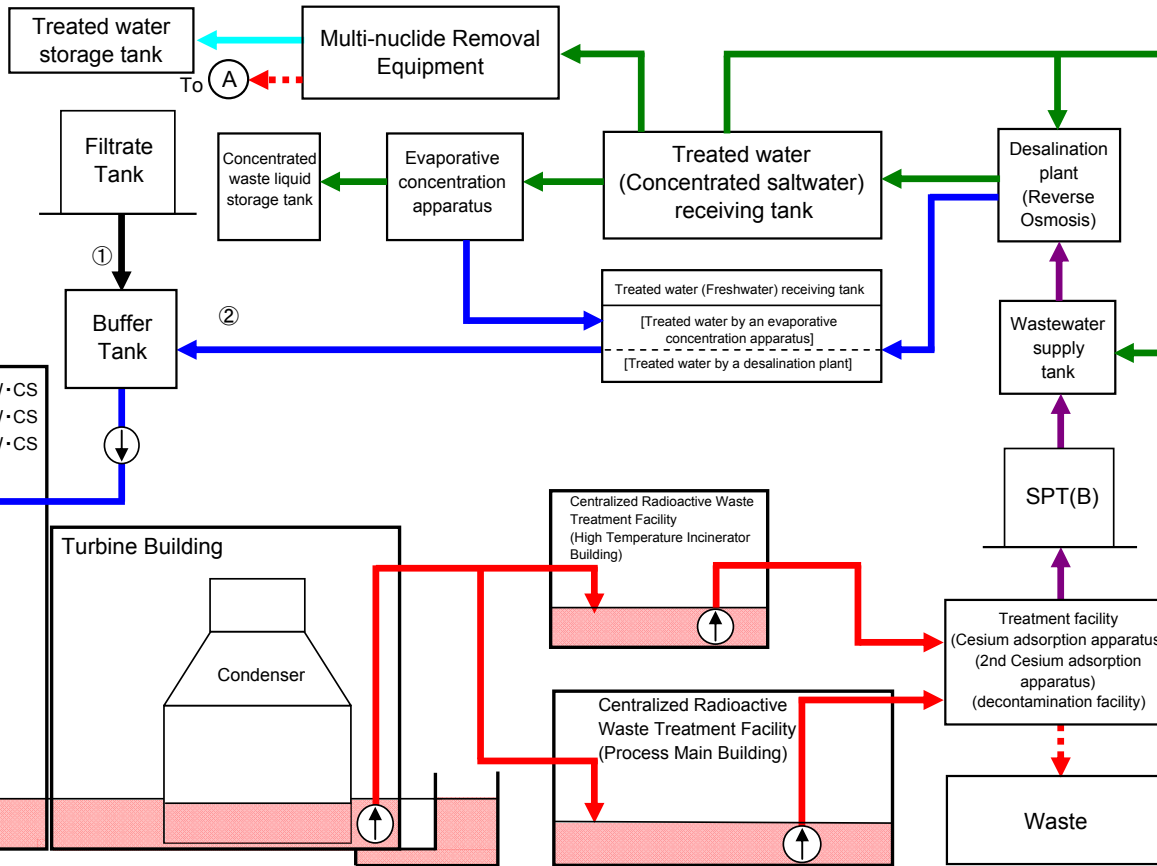
- Water transfer from Unit 2 to Unit 3 Turbine Building will be suspended.
- Water transfer from Unit 3 to the High Temperature Incinerator Building will be conducted.
- Water transfer from Unit 4 will be stopped continuously.
- Operation of 2nd Cesium Adsorption Apparatus is scheduled: Availability Factor 70% (Projected)
- Cesium Adsorption Apparatus will be stopped continuously.
- Storage capacity of the treated water storage tank will be changed by operating the tanks.

\*1 Shows the operational limit.  
 \*2 The underground reservoirs are not included in the figure.  
 \*3 Storage capacity of the filtrate water tank (4,600m<sup>3</sup>) is included in the figure.  
 \*4 The treated water from the Multi-nuclide Removal Equipment (under hot test) is stored. Freshwater and concentrated saltwater will be stored depending on the operation status.  
 \*5 Total treated amount of Cesium adsorption apparatus and 2nd Cesium adsorption apparatus  
 Breakdown of the treated amount: Cesium adsorption apparatus (0m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (5,880m<sup>3</sup>)  
 Breakdown of the cumulative treated amount: Cesium adsorption apparatus (203,740m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (636,180m<sup>3</sup>)  
 \*6 Breakdown of the used vessels: Cesium adsorption apparatus (466)  
 2nd cesium Cesium adsorption apparatus (94)  
 Storage container of the Multi-nuclide Removal Equipment (147) and treated column (0) Used vessels of mobile type treatment apparatus (13, include 11 vessels used for purification of spent fuel pool)

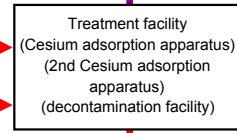
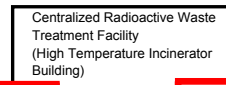
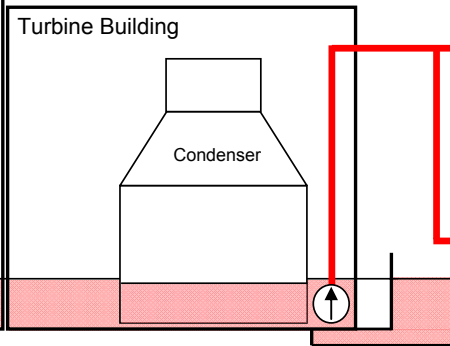
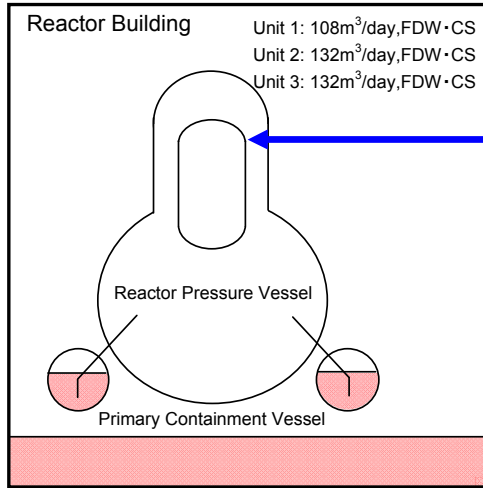
# Storage and treatment of high level radioactive accumulated water (January 7, 2013)

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 (1/1 - 1/7)	Change from last report
① Filtrate water	-
② Treated water (freshwater)	2,604m <sup>3</sup> No change
Cumulative treated water	412,449m <sup>3</sup>



Storage volume	Change from last report	Storage capacity <sup>1,2</sup>
Concentrated saltwater receiving tank <sup>3</sup>	336,039m <sup>3</sup> +2,324m <sup>3</sup>	348,200m <sup>3</sup>
Freshwater receiving tank	27,738m <sup>3</sup> -420m <sup>3</sup>	31,400m <sup>3</sup>
Concentrated waste liquid storage tank	9,205m <sup>3</sup> No change	9,500m <sup>3</sup>
Treated water storage tank <sup>4</sup>	35,882m <sup>3</sup> +1,050m <sup>3</sup>	47,900m <sup>3</sup>



Facility	Storage volume	Change from last report	Water level in T/B
Unit 1	Approx. 13,800m <sup>3</sup>	-100m <sup>3</sup>	OP.2,863 (Unit 2 T/B)
Unit 2	Approx. 20,300m <sup>3</sup>	-2,000m <sup>3</sup>	
Unit 3	Approx. 21,900m <sup>3</sup>	+600m <sup>3</sup>	OP.2,831 (Unit 3 T/B)
Unit 4	Approx. 16,700m <sup>3</sup>	+800m <sup>3</sup>	
<b>Total</b>	<b>Approx. 72,700m<sup>3</sup></b>		

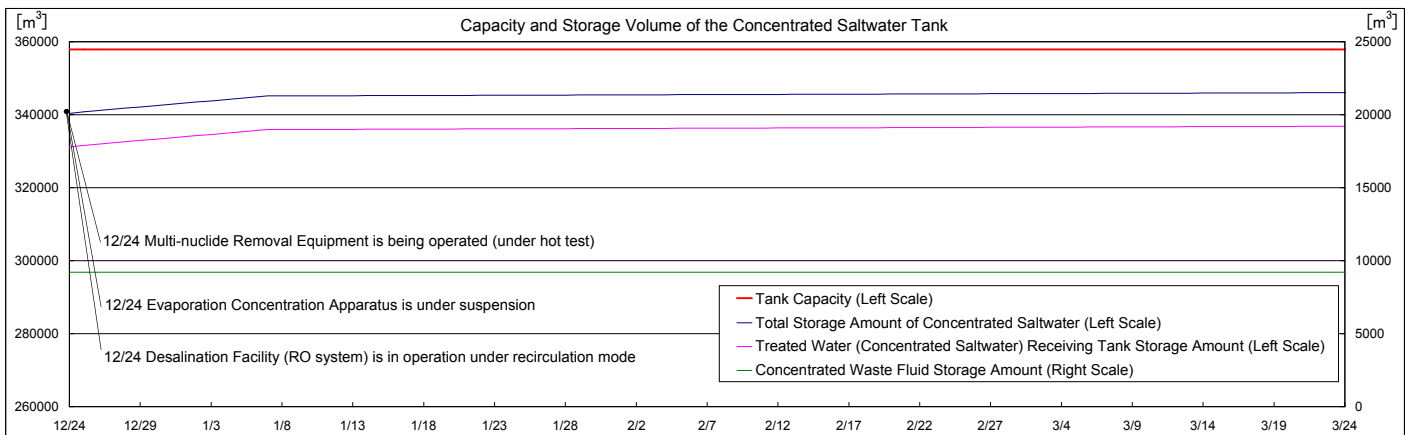
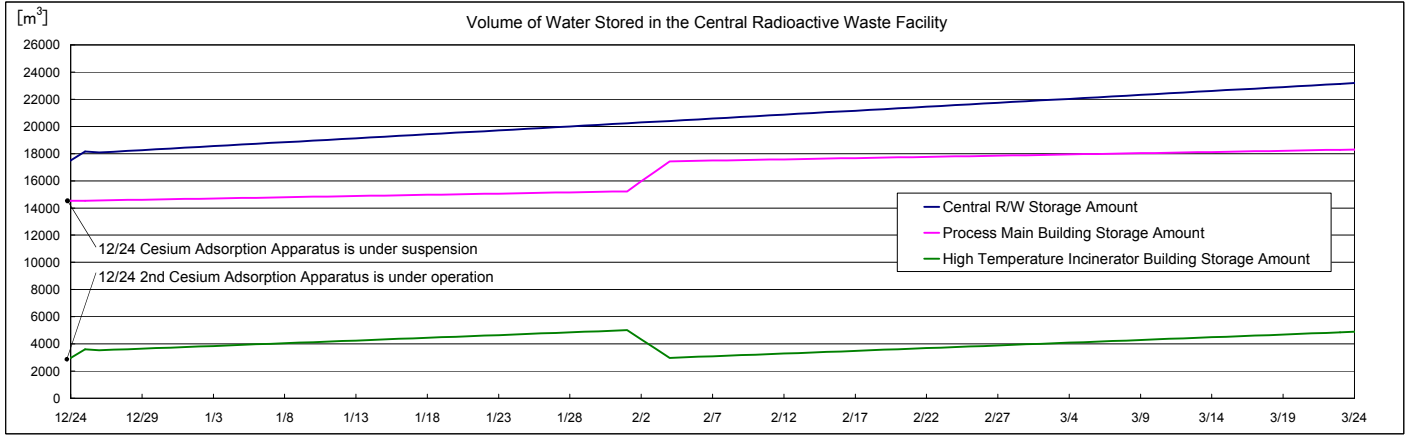
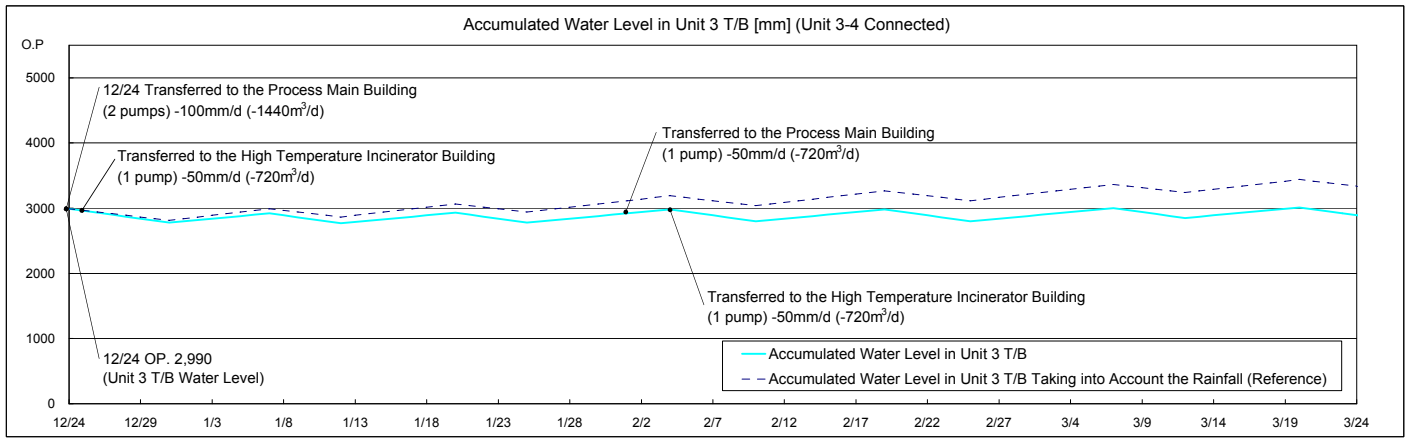
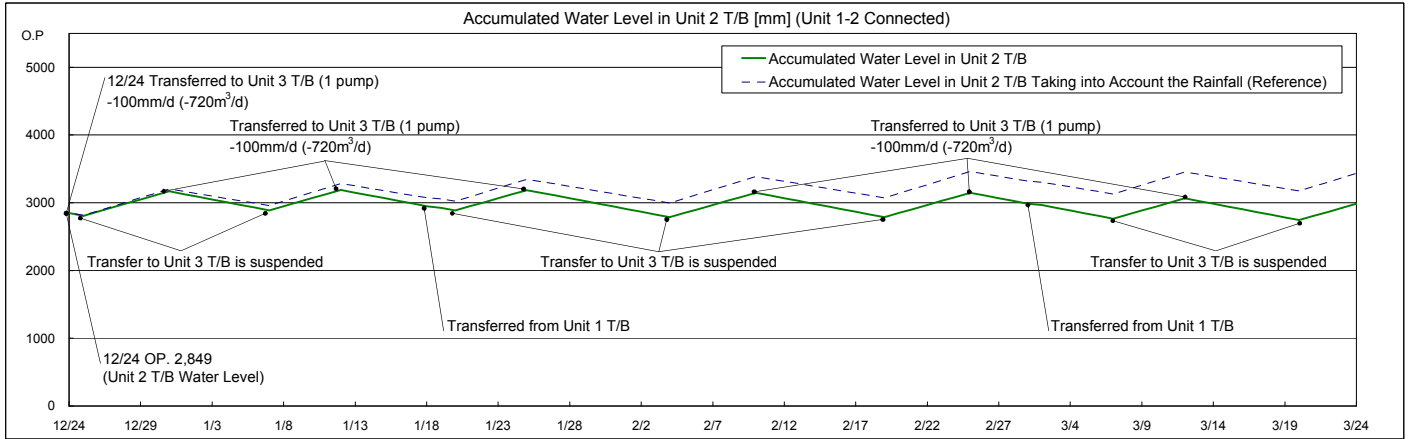
Storage Facility	Storage volume	Change from last report	Water level	Treated volume (1/1 - 1/7)	Cumulative treated volume	Waste produced	Change from last report	Storage capacity
Process Main Building	Approx. 14,770m <sup>3</sup>	+130m <sup>3</sup>	OP.4,157	Approx. 5,460m <sup>3</sup> *5	Approx. 845,380m <sup>3</sup> *5	Sludge	597m <sup>3</sup>	No Change
High Temperature Incinerator Building	Approx. 4,390m <sup>3</sup>	+830m <sup>3</sup>	OP.3,054			Used vessels	732 <sup>6</sup>	+12
<b>Total</b>	<b>Approx. 19,160m<sup>3</sup></b>							

[Highlights from the present status (December 31, 2013) to the supposition status (January 7, 2013)]

- Water transfer from Unit 2 to Unit 3 Turbine Building will be restarted.
- Water transfer from Unit 3 to the High Temperature Incinerator Building will be conducted.
- Water transfer from Unit 4 will be stopped continuously.
- Operation of 2nd Cesium Adsorption Apparatus is scheduled: Availability Factor 65% (Projected)
- Cesium Adsorption Apparatus will be stopped continuously.

\*1 Shows the operational limit.  
 \*2 The underground reservoirs are not included in the figure.  
 \*3 Storage capacity of the filtrate water tank (4,600m<sup>3</sup>) is included in the figure.  
 \*4 The treated water from the Multi-nuclide Removal Equipment (under hot test) is stored. Freshwater and concentrated saltwater will be stored depending on the operation status.  
 \*5 Total treated amount of Cesium adsorption apparatus and 2nd Cesium adsorption apparatus  
 Breakdown of the treated amount: Cesium adsorption apparatus (0m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (5,460m<sup>3</sup>)  
 Breakdown of the cumulative treated amount: Cesium adsorption apparatus (203,740m<sup>3</sup>)  
 2nd Cesium adsorption apparatus (641,640m<sup>3</sup>)  
 \*6 Breakdown of the used vessels: Cesium adsorption apparatus (466)  
 2nd cesium Cesium adsorption apparatus (94)  
 Storage container of the Multi-nuclide Removal Equipment (159) and treated column (0) Used vessels of mobile type treatment apparatus (13, include 11 vessels used for purification of spent fuel pool)

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



**Note**

- The treated water volume is assumed to be 780m<sup>3</sup>/d (Subject to change depending on the level of water accumulated in T/B).
- The accumulated water level in T/B is a simulation result in consideration of fluctuation of water level such as recent rainfall, inflow of groundwater, and etc.
- The accumulated water level in T/B is assumed to increase by 5mm daily, taking into consideration the average rain fall in the surrounding area of Fukushima Daiichi Nuclear Power Station (August-October in the past 3 years).