Situation of Storage and Treatment of Accumulated Water containing Highly Concentrated Radioactive Materials at Fukushima Daiichi Nuclear Power Station (466th Release)

August 31, 2020
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 containing 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 August 27, 2020 are shown in the Attachment -1.

3. Forecast of storing and treatment

(1) Short term forecast

Water transfer in Units 1 and 2 and Units 3 and 4 is planned based on the stored amount in the Accumulated Water Storing Facilities and the operating situation of the radioactive material treatment equipment and the subdrain catchment facility. 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 September 3, 2020 are 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 specific water-level difference between accumulated water in the building around and subdrain water and making the lowest floor surface of buildings other than Units 1 to 3 reactor buildings where circulating water is injected into exposed by 2020.

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
Storage and treatment of high level radioactive accumulated water (as of August 27, 2020)

### Storage Volume

<table>
<thead>
<tr>
<th>Facility</th>
<th>Storage Volume (m³)</th>
<th>Change from last report</th>
<th>Water level in T.P.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1</td>
<td>Approx.1,320</td>
<td>+20</td>
<td>+36</td>
</tr>
<tr>
<td>Unit 2</td>
<td>Approx.3,430</td>
<td>+60</td>
<td>Under T.P. -1,644</td>
</tr>
<tr>
<td>Unit 3</td>
<td>Approx.2,000</td>
<td>-90</td>
<td>Under T.P. -1,479</td>
</tr>
<tr>
<td>Unit 4</td>
<td>Approx.380</td>
<td>-70</td>
<td>Under T.P. -2,249</td>
</tr>
<tr>
<td>Total</td>
<td>Approx.7,130</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Main operations that have been conducted during the period from August 20, 2020 to August 27, 2020

- Water transfer from the Units 1-4 to the buildings (Units 1-4, Centralized radioactive waste treatment facilities) and to the treatment facilities was conducted whenever necessary.
- Due to other works, water transfer to the buildings (Units 1-4, Centralized radioactive waste treatment facilities) was conducted whenever necessary.
- Operations of the Cesium Adsorption Apparatus have been suspended.
- Operations of the 2nd Cesium Adsorption Apparatus have continued to be conducted; the availability factor is 39% (previous simulated: 45%).
- Operations of the 3rd Cesium Adsorption Apparatus have been suspended.
- Storage capacity of treated water was changed as operations of new tanks started.

### Treatment

- **Concentrated waste liquid storage tank**: 9,302 m³
- **Treated water storage tank**: 320,000 m³
- **Strontium-treated water storage tank**: 22,800 m³
- **Water injection tank (CST) (Buffer tank)**: 6,526 m³

### Water Levels

- **Reactor Building**: 3rd Cesium adsorption apparatus (40,150 m³)
- **Water Injection Tank (CST)**: 2,151 m³
- **Reactor Pressure Vessel**: Unit 1: 13 m³, Unit 2: 17 m³, Unit 3: 16 m³, Unit 4: 18 m³

### Water Concentration

- **Before/After Desalination**: 410 ppm/1 ppm (Sampled on Jul 7, 2020)
- **Before/After Reverse Osmosis Circulation**: 60 ppm/1 ppm (Sampled on Aug 1, 2020)
- **Before/After Evaporative Concentration**:
  - Unit 1: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 2: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 3: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)

### Radioactivity Concentration

- **Before/After Desalination**: 410 ppm/1 ppm (Sampled on Jul 7, 2020)
- **Before/After Reverse Osmosis Circulation**: 60 ppm/1 ppm (Sampled on Aug 1, 2020)
- **Before/After Evaporative Concentration**:
  - Unit 1: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 2: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 3: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)

### Chloride Concentration

- **Before/After Desalination**: 400 ppm/1 ppm (Sampled on Jul 7, 2020)
- **Before/After Reverse Osmosis Circulation**: 60 ppm/1 ppm (Sampled on Aug 1, 2020)
- **Before/After Evaporative Concentration**:
  - Unit 1: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 2: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 3: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)

### Place of Sampling

- **Reactor Building**: 3rd Cesium adsorption apparatus (40,150 m³)
- **Water Injection Tank (CST)**: 2,151 m³
- **Reactor Pressure Vessel**: Unit 1: 13 m³, Unit 2: 17 m³, Unit 3: 16 m³, Unit 4: 18 m³

### Storage Capacity

- **Wastewater supply tank**: 203 m³
- **Multi-nuclide Removal**: 2,460 m³
- **Evaporative Concentration**:
  - Unit 1: 67 m³/day, FDW
  - Unit 2: 74 m³/day, FDW
  - Unit 3: 72 m³/day, FDW
  - Unit 4: 60 m³/day, FDW

### Water Treatment

- **Reverse osmosis**: Treated water (concentrated saltwater), pipe removal
- **Desalination**:
  - Treated water from Multi-nuclide Removal Facility Sample water storage tank (Concentrated saltwater)
  - Strontium-treated water storage tank (0 m³)
  - Water level in Reactor Pressure Vessel: Unit 1: 13 m³, Unit 2: 17 m³, Unit 3: 16 m³, Unit 4: 18 m³

### Radioactivity levels

- **Reactor Pressure Vessel**: Exit of cesium adsorption apparatus: 3.8E+03 Bq/L (Sampled on Mar 22, 2019)
- **Condenser**: Before/After Desalination: 410 ppm/1 ppm (Sampled on Jul 7, 2020)
- **Before/After Reverse Osmosis Circulation**: 60 ppm/1 ppm (Sampled on Aug 1, 2020)
- **Before/After Evaporative Concentration**:
  - Unit 1: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 2: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
  - Unit 3: 3,400 ppm/1 ppm (Sampled on Aug 1, 2020)
# Storage and treatment of high level radioactive accumulated water (as of September 3, 2020)

## Storage Facility

<table>
<thead>
<tr>
<th>Facility</th>
<th>Storage volume (m³)</th>
<th>Change from last report</th>
<th>Water level</th>
<th>Watertreatment volume (m³)</th>
<th>Cumulative treated volume (m³)</th>
<th>Water produced</th>
<th>Change from last report</th>
<th>Storage capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Main Building</td>
<td>Approx.7,500</td>
<td>+120</td>
<td>T.P. − 1,271</td>
<td>Approx.3,780</td>
<td>Approx.2,316,020</td>
<td>Sludge</td>
<td>422</td>
<td>700</td>
</tr>
<tr>
<td>High Temp Inoculator Building</td>
<td>Approx.2,560</td>
<td>−1,400</td>
<td>T.P. − 111</td>
<td>Approx.3,780</td>
<td>Approx.2,316,020</td>
<td>Used vessels</td>
<td>4,911 *6</td>
<td>6,372</td>
</tr>
<tr>
<td>Total</td>
<td>Approx.8,060</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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%. Under these conditions, the storage volume of water is calculated based on that of the water treated through the ALPS and other facilities.

*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 accommodates 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 and 3rd Cesium adsorption apparatus.

*6 Breakdown of the cumulative treated amount: Cesium adsorption apparatus (394,720 m³) 2nd Cesium adsorption apparatus (1,881,150 m³) 3rd Cesium adsorption apparatus (65,370 m³) 3rd Cesium adsorption apparatus (39,720 m³)

*7 Volume of the Strontium-treated water in the welded-type tank.

*8 Volume of the Strontium-treated water remaining in the frange-type tanks.

*9 Volume of the treated water stored in the welded-type tank.

*10 Volume of the high performance ALPS temporary storage tanks (welded-type) and the ALPS temporary storage tanks (frange-type).

*11 Volume of the treated water stored in the ALPS temporary storage tanks (frange-type), the additional ALPS temporary storage tanks (welded-type) and the ALPS temporary storage tanks (welded-type) and the ALPS temporary storage tanks (frange-type).

*12 Volume of the treated water stored in the reuse welded-type tanks which stored strontium-treated water before.

*13 Volume of the treated water stored in the reuse welded-type tanks which stored strontium-treated water before.

The amount of water treated through the 2nd Cesium Adsorption Apparatus is estimated to be 780 m$^3$/day (subject to change depending on the factors such as the levels of water accumulated in T/Bs.).

*Accumulated Water Levels in Unit 2, 3 and 4 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, 3 and 4 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 8 mm per 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 2015 to 2017.

Unit 2 Turbine Building water level is controlled by retained water transfer pumps in the Unit 2 reactor building.

Unit 3 Turbine Building water level is controlled by retained water transfer pumps in the Unit 3 turbine building.

Unit 4 Turbine Building water level is controlled by retained water transfer pumps in the Unit 4 turbine building.

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

- **Accumulated Water Level in Unit 2 Turbine Building**
  - 8/27 T.P. -1,271 (Water level inside Unit 2 Turbine Building)

- **Accumulated Water Level in Unit 3 Turbine Building**
  - 8/27 Under T.P. -1,644 (Water level inside Unit 3 Turbine Building)

- **Accumulated Water Level in Unit 4 Turbine Building**
  - 8/27 Under T.P. -1,479 (Water level inside Unit 4 Turbine Building)

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**Storage Capacity of the Centralized Radioactive Waste Treatment Facility**

- Centralized Radioactive Waste Total Storage Amount
- Process Main Building Storage Amount
- High Temperature Incinerator Building Storage Amount

**Storage Capacity and Volume of the Concentrated Saltwater Tank**

- Tank Capacity
- Concentrated Waste Fluid Storage Amount
- Treated Water (Concentrated Saltwater) Receiving Tank Storage Amount

- The residual water of concentrated saltwater which is left at the bottoms of the storage tanks has been being treated.

- The operations of the Evaporation Concentration Apparatus have been suspended.

- Multi-nuclide Removal Equipment has been in operation (under hot test).

- Extension Multi-nuclide Removal Equipment has been in operation.

- The operations of the other treatment facilities have been suspended.

- Storage place of water transported from the Units 1-4 will be changed over from the high temperature incinerator building to the process main building.

- Storage place of water transported from the Units 1-4 will be changed over from the process main building to the high temperature incinerator building.

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Note:
- The amount of water treated through the 2nd Cesium Adsorption Apparatus is estimated to be 780 m$^3$/day (subject to change depending on the factors such as the levels of water accumulated in T/Bs.)
- Accumulated Water Levels in Unit 2, 3 and 4 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 8 mm per 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 2015 to 2017.
- Unit 2 Turbine Building water level is controlled by retained water transfer pumps in the Unit 2 reactor building.
- Unit 3 Turbine Building water level is controlled by retained water transfer pumps in the Unit 3 turbine building.
- Unit 4 Turbine Building water level is controlled by retained water transfer pumps in the Unit 4 turbine building.