New Definition of ALPS Treated Water and the Amount of Tritium in Water being stored in Tanks

April 27, 2021
Tokyo Electric Power Company Holdings, Inc.
In light of the basic policy of the government and TEPCO Holding’s action in response to the government’s policy, the term “ALPS treated water” will be defined as, “water treated with multi-nuclide removal equipment (ALPS) so that the concentrations of radioactive materials other than tritium sufficiently satisfy regulatory standards for safety.” All other water will be defined as follows.

Concentrations of tritium in water stored in tanks have been carefully measured recently, so those measurements have been included in this material.

### 1. The definition of “ALPS treated water”

<table>
<thead>
<tr>
<th>ALPS treated water</th>
<th>Treated water to be re-purified</th>
<th>Sr removed water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sum of ratios of legally required concentrations is less than 1 (Estimate by 7 nuclides in water sampled from outlet)</td>
<td>Sum of ratios of legally required concentrations is 1 or higher (Estimate by 7 nuclides in water sampled from outlet)</td>
<td>Sum of ratios of legally required concentrations has yet to be evaluated</td>
</tr>
<tr>
<td>323,900m³ (2020/12/31)</td>
<td>805,100m³ (2020/12/31)</td>
<td>-</td>
</tr>
<tr>
<td>1,156,800m³ (2020/12/31)</td>
<td>27,800m³ (2020/12/31)</td>
<td>20,221m³ (2021/4/15)</td>
</tr>
<tr>
<td>1,235,550m³ (2021/4/15)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,255,771m³ (2021/4/15)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

※：The concentration of 62 nuclides + C-14 in the water in sample tanks will be measured prior to discharge. If the concentration of these nuclides does not meet the definition of ALPS treated water, the water will be subject to secondary purification treatment.

- Updated once every three months (Treated water Portal Site)
- Updated once a week (Storage status of accumulated water, etc.)

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The relationship between the definition of ALPS treated water and equipment for sea discharge

Conceptual diagram of facilities for releasing ALPS treated water into the sea

**Secondary treatment**
Secondary treatment will be conducted as necessary to ensure that the level of radioactive materials excluding tritium is lower than the regulatory standard value for safety.

**Dilution**
As the water will be diluted with large amounts of seawater (diluted by more than hundred times), the sum of ratios of the concentration of each radionuclide other than tritium to the regulatory standard of each is less than 0.01 in the diluted water that will be discharged.

**Analysis of ALPS treated water**
TEPCO will publish the concentration of tritium, 62 nuclides (nuclides subject to removal by ALPS), and carbon-14 in ALPS treated water and the results of assessments as well as the third parties' measurement and assessment results.

**Concentration of tritium inside discharged water**
The tritium concentration of the discharged water will be less than 1500 Bq/L. This will be assessed based on the tritium concentration in the ALPS treated water before discharge and the amount of water it was diluted by.

**Amount discharged**
In the near term, discharge amounts will be within the threshold of 22 trillion Bq/year which is the target discharge management value for Fukushima Daiichi before the accident. This amount will be reviewed as needed based on progress made in decommissioning.

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**Secondary treatment facilities**
Secondary treatment will be conducted as necessary to ensure that the level of radioactive materials excluding tritium is lower than the regulatory standard value for safety.

**Sample tank**
Secondary treated water will be discharged as necessary to ensure that the level of radioactive materials excluding tritium is lower than the regulatory standard value for safety.

**Seawater transfer pump**
Mixed with seawater and dilute sufficiently.

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**Sr removed water**
ALPS treated water, etc.
Treated water to be re-purified
ALPS treated water
ALPS treated water
ALPS treated water

**On-site storage tank**

**Secondary treated water**

**Sample tank**

**Emergency isolation valve**

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**ALPS**

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2. Current amounts of tritiated water being stored in tanks on site at the power station

Current amounts of tritiated water being stored in tanks on site at the power station (as of April 1, 2021)

- Number of tanks: 1,047 *1
- Amount of water being stored in tanks: Approx. 1.25 million m$^3$ *2
  - Average tritium concentration: Approx. 620,000 Bq/L
  - Total amount of tritium: Approx. 780 trillion Bq

[Conversion to pure tritiated water: Approx. 15g]

*1: Total of ALPS treated water, etc. and Sr removed water
*2: Includes water at the bottom of tanks that is below the lowest point that can be measured by water level gauges
3. **Assessment of the total amount of tritium in tanks**

- The chart below shows the total amount of tritium in tanks at the Fukushima Daiichi Nuclear Power Station used to store ALPS treated water, etc. and Sr removed water as of April 1, 2021.

- The actual measurement for ALPS treated water, etc. tanks indicates actual radioactivity concentration measurements taken for tank groups that were completely full as of the end of December 2020 and considers the amount of tritium that has decayed as of April 1, 2021.

- The estimate for ALPS treated water, etc. tanks and Sr removed water tanks was calculated using the tritium concentration for tanks other than those mentioned above measured at the inlet to desalination equipment in January 2021 (approx. 450,000 Bq/liter)

<table>
<thead>
<tr>
<th>Tanks</th>
<th>Actual or Estimate</th>
<th>Storage amount*1</th>
<th>Amount of tritium*1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPS treated water, etc. tanks (Actual measurement)</td>
<td>Actual</td>
<td>Approx. 1.16 million m³</td>
<td>Approx. 737 trillion Bq</td>
</tr>
<tr>
<td>ALPS treated water, etc. tanks and Sr removed water tanks (Estimate)*2</td>
<td>Estimate</td>
<td>Approx. 100,000 m³</td>
<td>Approx. 43 trillion Bq*3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>Approx. 1.25 million m³</strong></td>
<td><strong>Approx. 780 trillion Bq</strong></td>
</tr>
</tbody>
</table>

*1: Totals may not add up exactly since decimals have been rounded.
*2: Includes ALPS treated water, etc. tanks and Sr removed water tanks that have not been measured or to which water is being transferred.
*3: This is only an estimate and the value may be corrected in the future in accordance with actual measurements.
Compared to 2019, progress with the treatment of Sr removed water has enabled more ALPS treated water, etc. tanks to be measured, so the estimate for the storage amount dropped from approximately 340,000m³ to approximately 100,000m³. Furthermore, compared to the concentration used when calculating estimates (approximately 1.05 million Bq/liter), the actual concentration was lower thereby resulting in a decrease in the calculated amount of tritium.

<table>
<thead>
<tr>
<th>Differences</th>
<th>Current</th>
<th>15th Subcommittee meeting (Nov. 18, 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decay assessment date</td>
<td>2021/4/1</td>
<td>October 31, 2019</td>
</tr>
<tr>
<td>Alps treated water, etc. tank storage amount (actual measurement)</td>
<td>Approximately 1.16 million m³ (full as of December 2020)</td>
<td>Approximately 830,000 m³ (full as of June 2019)</td>
</tr>
<tr>
<td>Concentration in ALPS treated water, etc. tanks and Sr removed water tanks (Estimate)*1</td>
<td>Approximately 450,000 Bq/L (January 2021)</td>
<td>Approximately 1.05 million Bq/liter (Average from September–April 2019)</td>
</tr>
<tr>
<td>ALPS treated water, etc. tanks and Sr removed water tanks storage amount (actual measurement)*1</td>
<td>Approximately 100,000 m³ (total-actual measurement)</td>
<td>Approximately 340,000 m³ (total-actual measurement)</td>
</tr>
<tr>
<td>Total storage amount</td>
<td>Approximately 1.25 million m³ (as of April 1, 2021)</td>
<td>Approximately 1.17 million m³ (as of October 31, 2019)</td>
</tr>
</tbody>
</table>

*1: Includes ALPS treated water, etc. tanks and Sr removed water tanks that have not been measured or to which water is being transferred.
Total amount of tritium contained in treated water

The chart below shows the total amount of tritium in tanks at the Fukushima Daiichi Nuclear Power Station being used for the storage of water treated with multi-nuclide removal equipment (hereinafter referred to as, “ALPS treated water”) as of October 31, 2019.

The actual measurement for ALPS treated water tanks indicates actual radioactivity concentration measurements taken for tank groups that were completely full as of June of this year and considers the amount of tritium that has decayed as of October 31.

The estimate for ALPS-treated water tanks, etc. was calculated using the average tritium concentration for tanks other than those mentioned above measured at the outlet of treatment equipment between April and September 2019 (Approx. 1.05 million Bq/L)

<table>
<thead>
<tr>
<th>Tank water level</th>
<th>Actual or Estimate</th>
<th>Storage Amount</th>
<th>Amount of Tritium</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPS-treated water tanks (Actual measurement)</td>
<td>Actual</td>
<td>Approx. 830,000 m³</td>
<td>Approx. 5.06 million Bq</td>
</tr>
<tr>
<td>ALPS-treated water tanks, etc. *1 (Estimate)</td>
<td>Estimate</td>
<td>Approx. 340,000 m³</td>
<td>Approx. 3.5 trillion Bq*2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>Approx. 1.17 million m³</td>
<td>Approx. 8.56 million Bq</td>
</tr>
</tbody>
</table>

*1: Includes ALPS-treated water tanks and Sr-treated water tanks that have not been measured or to which water is being transferred.
*2: This is only an estimate and the value may be corrected in the future in accordance with actual measurements

For the following estimate of the time axis for storage/disposal, the aforementioned total has been rounded to approximately 860 trillion Bq.

Note: ALPS treated water in the reprinted document refers to the previous definition of the term (“water treated with multi-nuclide removal equipment (ALPS)”)

Reference: Past assessment of the total amount of tritium in tanks