The Outline of the Handling of ALPS Treated Water at Fukushima Daiichi NPS (FDNPS)

Agency for Natural Resources and Energy
METI

December 2019
1-1. Generation of contaminated water, purification process and tank storage

◇ Water gets contaminated when it touches the damaged reactors and fuel debris in buildings.

➢ The level of groundwater outside is controlled to be higher than that of contaminated water inside the buildings to prevent the water flowing out of the building.

Groundwater keeps flowing into the buildings

◇ TEPCO has been successful in removing most of radionuclides except tritium from contaminated water.

➢ ALPS (Multi-nuclide retrieval equipment) and the other equipment have been used. See more at P13

➢ It is ALPS treated water, NOT -contaminated water, that is stored at the FDNPS.
➢ Radioactive materials in ALPS treated water are reduced to about 1/1,000,000 (one millionth) compared to the water before purification.

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ALPS

① Contaminated water is sent to purification equipment such as ALPS.

② Most of the nuclides except tritium are removed in this process.

③ Treated water is stored in tanks.
1-2. Key figures of ALPS treated water

<table>
<thead>
<tr>
<th>Key Figures for ALPS treated water at the site (As of Dec 12, 2019)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of tanks</td>
</tr>
<tr>
<td>Tank Storage volume</td>
</tr>
<tr>
<td>Planned capacity (Under current plan)</td>
</tr>
<tr>
<td>Annual increase of ALPS treated water</td>
</tr>
</tbody>
</table>

**Time to reach its full capacity (forecast): around summer of 2022**

- **Amount of Tritium (tritiated water) in tanks**: Approx. 860 TBq* (16g)
  (*TBq = 1×10¹² Becquerel)

- **Average Concentration of Tritium**: 0.73 MBq/L
  (*MBq = 1×10⁶ Becquerel)

※ As of Oct 31, 2019
※ Currently, radionuclides other than tritium are found in ALPS treated water in tanks.
※ If the treated water is discharged into the environment, it will be re-purified and diluted to meet the standards for discharge.

**TEPCO will further examine its plan, considering limitation of site capacity as well as the tanks and other facilities which will be needed for decommissioning.**
2. Technical evaluation of disposal methods by the Tritiated Water Task Force

- "The Tritiated Water Task Force (2013-2016)"
  - Technical feasibility (including monitoring to ensure safety), regulatory feasibility period and cost of **five handling methods** were examined;
    - All cases were examined on the premise that **there is no scientific impact on the human habitant**.
    - Verification project showed that **the separation technology for tritium could not be utilized**.

- "The Subcommittee on Handling ALPS Treated Water (2016-)")"
  - Handling of ALPS treated water has been continuously examined in a comprehensive manner, including from the perspective of countermeasure for reputational damage and of ensuring scientific safety.
    - All methods are examined on the condition that radionuclides other than tritium (Cs-137, Sr-90, etc) are sufficiently removed by further retreating the ALPS treated water.

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### Table Results of assessment of Tritiated water task force

<table>
<thead>
<tr>
<th>Method of disposal</th>
<th>(1) Example of geosphere injection</th>
<th>(2) Example of discharge to the sea</th>
<th>(3) Example of vapor release</th>
<th>(4) Example of hydrogen release</th>
<th>(5) Example of underground burial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Image</strong></td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td><img src="image5.png" alt="Image" /></td>
</tr>
<tr>
<td><strong>Technical feasibility</strong></td>
<td>Example) TMI-2 - water volume: 8,700 m³ - Tritium volume: 24 tri. Bq. - Tritium conc.: 2.8mil. Bq/L - Total period: 2.8 years</td>
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<td>Example) TMI-2 - water volume: 8,700 m³ - Tritium volume: 24 tri. Bq. - Tritium conc.: 2.8mil. Bq/L - Total period: 2.8 years</td>
</tr>
<tr>
<td><strong>Regulatory feasibility</strong></td>
<td>Feasible</td>
<td>Feasible</td>
<td>Feasible</td>
<td>Feasible</td>
<td>New standards might be needed.</td>
</tr>
</tbody>
</table>
1. The previous discussion was reviewed.
2. Timeline of discharge into the environment and estimation of public exposures were discussed.

[1. Issues discussed under the subcommittee]

- **ALPS treated water/re-treatment of the water**
  - To remove radionuclides other than tritium and to ensure regulatory standards, **ALPS treated water will be re-treated** before discharge.

- **Scientific characteristics of tritium**
  - At a low concentration, radiation exposure from tritium is extremely low, and the effect of OBT is limited. OBT: Organically bound tritium

- **ALPS treated water storage/continuation of storage**
  - ALPS treated water is stored in tanks, with number of countermeasure for leakage from tanks.
  - The whole premise of the FDNPS should be effectively utilized to proceed decommissioning work, considering the necessary facilities such as tanks and storages

- **Countermeasures for reputational damage**
  - Countermeasures should be constantly examined, by analyzing mechanism which creates such damage
    - Risk communication measures, especially for international community
    - Economic measures for reputational damage

**Effective monitoring**
- Effective monitoring to confirm both 1) safety at the time of discharge and 2) safety of surrounding environment should be conducted.
- Monitoring results should be shared in a transparent manner, in order to dispel out concerns over radioactivity.

**Draft Options for handling method**

1. Controlled discharge to the sea
2. Controlled discharge to the air
3. Combination of [1] and [2]

Options will be further discussed along with the countermeasures for reputational damage.

**Estimation of public exposures, Case studies for discharge**
- Assumptions of the estimation and parameters were discussed.
- The revision on public exposures was made for case studies to consider the amount of tritium in annual discharged per year.
3-1. Impact assessment for environmental release of ALPS treated water

- Using **UNSCEAR assessment model*** and precondition that all the treated water stored in tanks (containing 860TBq of tritium) is discharged per year ➔ See more at P7

(*“Sources, effects and risks of ionizing radiation (UNSCEAR 2016)” Annex A “methodology for estimating public exposures due to radioactive discharges)

- **[case 1]** Discharge to the **sea** ------- Approx. 0.000052 to 0.00062 mSv/year
- **[case 2]** Discharge to the **air** ------- Approx. 0.0013 mSv/year

- In both discharge methods, the impact of the **radiation from the discharges are sufficiently small**, compared with **natural exposure of 2.1 mSv/year in Japan**.

- The impact of the [case 1 (sea)] is less than half of that of [case 2(air)].

<table>
<thead>
<tr>
<th>Exposure dose [mSv/y]</th>
<th>discharge to the sea※1</th>
<th>discharge to the air※2</th>
</tr>
</thead>
<tbody>
<tr>
<td>All radionuclides※3</td>
<td>0.000052-0.00062</td>
<td>0.0013※4</td>
</tr>
<tr>
<td>- tritium</td>
<td>0.0000043</td>
<td>0.0012</td>
</tr>
</tbody>
</table>

※1 Sum of external dose from beaches and internal dose from ingesting marine life.
※2 Sum of external dose from the atmosphere and soils, and internal dose from inhaling the air and ingesting terrestrial life (at 5km points from the FDNPS)
※3 Estimation was conducted on the two assumptions that “ND (Not Detected)” nuclides are 1) their ND value and 2) zero.
※4 For exposure dose for [case 2 (air)], there is no difference between the results from two assumptions

**Comparison of radiation impact between natural exposure and discharging treated water containing 860 TBq of tritium**

Discharge to the air
Discharge to the sea
Natural exposure

0.05 0.1 0.15 2.05 2.1 2.15 mSv/y
3-1. Impact assessment for environmental release of ALPS treated water –UNSCEAR Model –

● UNSCEAR Model
  - Made for public exposure assessment in the case of radionuclides discharge, both to the sea and to the air, on the assumption that there has been constant discharge*.
    (* assess the public exposure in the 100th year, on the assumption that there will be a continuous and constant discharge for 100 years)

[Case 1] Discharge to the sea
  - Public exposure is calculated as the sum of external dose from beaches and internal dose from ingesting marine life.
  - For the assessment, sea area is divided into local sea areas (area with 1 billion m³ of sea water) and regional sea area (with 1000 trillion m³)
    - Rate of marine food from local sea area: Fish 0.25, Crustacea 1.0, Mollusk 1.0
    - Rate of marine food from regional sea area: Fish 0.75, Crustacea 0, Mollusk 0
    - Amount of Food consumption per person (kg/year): Asia + Pacific parameters (Fish 6.9, Crustacea 1.4, Mollusk 2.4)

[Case 2] Discharge to the air
  - Public exposure is calculated as the sum of external dose from the atmosphere and soil, and internal dose from inhaling the air and ingesting terrestrial life (at 5km points off the leeward side of the FDNPS).
    - Rate of the time staying outside: 0.2
    - Rate of the local terrestrial food: 0.25
    - Amount of Food consumption per person (kg/year): Asia + Pacific parameters (Grains 141.5, Plants/Fruits 240.8, Mild/Dairy products 44.5, Meat/Internal organs 29.5)

Other parameters for the assessment
  - Assumption of concentration of tritium before dilution: 1 M Bq/L
    (concentration rate will be set to meet the standard before discharge)
  - Assumption of concentration of radionuclides other than tritium before dilution: Monitoring data of the water stored in K4 tank area**
    (**) Radionuclides that are not detected (ND) is assumed to be 1) their ND value and 2) zero, $^{14}$C = 10Bq/L)
4. Case Studies for timeline

- In considering the period for decommissioning, there is a trade-off between the starting time of discharge and the annual amount of tritium discharged.
- The revision on public exposure was made to consider the amount in annual of tritium discharged per year. This estimation does not consider the natural decay of tritium.

【Simulation on the duration of discharge and the amount of tritium annually discharged※】

<table>
<thead>
<tr>
<th>Start of discharge</th>
<th>22 T Bq/year</th>
<th>Duration of discharge in the three cases</th>
<th>100 T Bq/year</th>
<th>Tank capacity needed (Maximum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>at 2020/1/1</td>
<td>33 years (2052)</td>
<td>19 years (2038)</td>
<td>10 years (2029)</td>
<td>About 1.30 million m³</td>
</tr>
<tr>
<td>at 2025/1/1</td>
<td>29 years (2053)</td>
<td>17 years (2041)</td>
<td>9 years (2033)</td>
<td>About 1.47 million m³</td>
</tr>
<tr>
<td>at 2030/1/1</td>
<td>25 years (2054)</td>
<td>14 years (2043)</td>
<td>8 years (2037)</td>
<td>About 1.65 million m³</td>
</tr>
<tr>
<td>at 2035/1/1</td>
<td>21 years (2055)</td>
<td>12 years (2046)</td>
<td>7 years (2041)</td>
<td>About 1.83 million m³</td>
</tr>
</tbody>
</table>

※ Detailed technical assessment including tank construction is not conducted.
Role of the subcommittee:
1) to examine in a comprehensive manner, such as countermeasures for reputational damage, and
2) to compile report for the government

GOJ will decide basic policy, after receiving report of subcommittee and having stakeholder discussion.
References
[Ref.1] Decommissioning of TEPCO Fukushima Daiichi NPS (FDNPS)

◊ **Fukushima Daiichi Decommissioning is a continuous risk reduction activity** to protect the people and the environment from the risks associated with radioactive substances by:
  - Removing spent fuel and fuel debris from the Reactor Building
  - Reducing the risks associated with contaminated water and radioactive waste
◊ **Safe and steady decommissioning is a prerequisite for reconstruction of Fukushima**

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**Spent fuel (Spent fuel pool)**
Fuel that remains after its usage for power generation. Continuous cooling is needed to suppress the heat.

**Fuel Debris**
Fuel that has melted and solidified by the accident. Continuous cooling is needed to suppress the heat.

**Contaminated Water Management**

**Radioactive Solid Waste Management**

![Diagram showing decomposition process]

- **Removing fuel from the Spent Fuel Pool**
  - Units 1 and 2: Rubble removal
  - Unit 3: Installation of fuel removal equipment
  - Unit 4: Fuel removal, Storage/Transportation

- **Units 1–3**
  - Fuel debris retrieval
  - Ascertaining of the situation inside the PCV/consideration of fuel debris retrieval etc.
  - Fuel debris retrieval
  - Storage/Transportation

- **Disassembly of reactor facility, etc.**
- **Consideration of scenario and technologies**
- **Design and construction of equipment**
- **Dismantling and other tasks**

- **Current progress**

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◇ **Fukushima Daiichi Decommissioning** is a continuous risk reduction activity to protect the people and the environment from the risks associated with radioactive substances by:

- Removing spent fuel and fuel debris from the Reactor Building
- Reducing the risks associated with contaminated water and radioactive waste

◇ **Safe and steady decommissioning** is a prerequisite for reconstruction of Fukushima.
• The environmental impact on the site and surrounding area have been **significantly reduced**.
Two regulatory Standards:

1) **Applicable to storage:** to keep site boundary dose levels less than 1mSv/year
   - Current operational goal of ALPS

2) **Applicable to release to the environment:** to keep radionuclides concentrations of treated water less than the regulatory limit.

There are various concentration of ALPS treated water in the tanks, because:

- Concentration of ALPS treated water depends on the attributes of water to be treated and operation management of ALPS such as frequency of absorbent exchange; and
- Especially in early years, before improvement of ALPS performance, concentrations of ALPS treated water is relatively higher.

In case of releasing ALPS treated water to the environment, the water needs to satisfy standard 2).

- TEPCO announced to re-purify ALPS treated water, to meet standard 2) for radionuclides other than tritium.
Tritium is a relative of hydrogen that emits weak radiation.

Tritium exists naturally and is found in water such as water vapour in the atmosphere, rain, sea water, and tap-water, as tritiated water has similar properties as that of water.

- It has not been found that tritium concentrates in human beings and particular living organisms.
- Impact on health is very low, around 1/700 of that of Cesium 137.
- NPPs in Japan and overseas have been discharging water containing tritium for more than 40 years in compliance with the standard limits based on the laws and regulations.
- Concentration of tritium in sea water near NPPs are significantly lower than that of drinking water standards in the world.
- It has not been found that tritium from NPPs have an impact on health.
- The amount of tritium, which is generated at domestic nuclear power plants (NPPs) and released to the sea annually*, is around 1.7 times as much as that of tritium found in annual precipitation in Japan. (* 5 year average before 2011)

### Comparison of impact of tritium and well-known radioactive nuclides on living organisms

- Tritium (Water)
- Carbon 14: 10000 times
- Sodium 24: 1000 times
- Phosphorus 32: 100 times
- Potassium 40: 10 times
- Cobalt 60: Actual size
- Iodine 131: Existing in Nature
- Cesium 137: Existing in Nature
- Plutonium 239: Non-destructive inspection radiation source
From nuclear power plant and reprocessing facilities in overseas, tritium (Liquid, Steam) has been discharged to the ocean, river and air. (*TBq = $1 \times 10^{12}$ Becquerel)

- **UK**: Sellafield reprocessing facility, Liquid: About 1540 TBq (in 2015)
- **UK**: Haysham B NPP, Liquid: About 390 TBq (in 2015)
- **UK**: Sizewell B NPP, About 20 TBq (in 2015)
- **Germany**: Gräfen Rheinfeld NPP, Liquid: About 21 TBq (in 2002, not in operation)
- **Germany**: Gundremmingen B-C NPP, Liquid: About 5.9 TBq, Steam: About 1.2 TBq (in 2002)
- **Slovenia**: Krsko NPP, Liquid: About 13 TBq (in 2002)
- **Romania**: Cernavoda NPP, Liquid: About 85 TBq, Steam: About 286 TBq (in 2002)
- **Spain**: Asco NPP, Liquid: About 95 TBq (in 2002)
- **Spain**: Cofrentes NPP, Liquid: About 3.1 TBq, Steam: About 3.9 TBq (in 2002)
- **France**: La Hague reprocessing plant, Liquid: About 13700 TBq, Steam: About 78 TBq (in 2002)
- **France**: Tricastin NPP, Liquid: About 54 TBq (in 2002)
- **Korea**: Wolseong NPP, Liquid: About 17 TBq, Steam: About 119 TBq (in 2016)
- **Korea**: Kori NPP, Liquid: About 36 TBq, Steam: About 16 TBq (in 2015)
- **Japan**: Fukushima Daiichi NPP, Liquid: About 2.2 TBq, Steam: About 1.5 TBq (in FY2010)
- **Japan**: Lone NPP, Liquid: About 2.2 TBq, Steam: About 1.5 TBq (in FY2010)
- **US**: Diablo Canyon 1 NPP, Liquid: About 51 TBq, Steam: About 11 TBq (in 2002)
- **US**: Diablo Canyon 1 NPP, Liquid: About 51 TBq, Steam: About 11 TBq (in 2002)
- **US**: Callaway NPP, Liquid: About 42 TBq (in 2002)
- **US**: Grand Gulf NPP, Liquid: About 2.0 TBq, Steam: About 2.6 TBq (in 2002)
- **US**: Brunswick 1 NPP, Liquid: About 0.2 TBq, Steam: About 4.3 TBq (in 2002)
- **Canada**: Bruce A, B NPP, Liquid: About 892 TBq, Steam: About 1079 TBq (in 2015)
- **Canada**: Darlington NPP, Liquid: About 241 TBq, Steam: About 254 TBq (in 2015)
- **Canada**: Pickering A, B NPP, Liquid: About 372 TBq, Steam: About 535 TBq (in 2015)
- **China**: Daya Bay NPP, About 42 TBq (in 2002)
- **Taiwan**: Maanshan NPP, Liquid: About 40 TBq, Steam: About 10 TBq (in 2002)
- **China**: Daya Bay NPP, About 42 TBq (in 2002)
- **Korea**: Wolseong NPP, Liquid: About 17 TBq, Steam: About 119 TBq (in 2016)
- **Canada**: Bruce A, B NPP, Liquid: About 892 TBq, Steam: About 1079 TBq (in 2015)
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- **Taiwan**: Maanshan NPP, Liquid: About 40 TBq, Steam: About 10 TBq (in 2002)
- **US**: Brunswick 1 NPP, Liquid: About 0.2 TBq, Steam: About 4.3 TBq (in 2002)

Source: UK: Radioactivity in Food and the Environment, 2015
Canada: Canadian National Report for the Convention on Nuclear Safety, Seventh Report
France: Tritium White paper 2016
Korea: FY2016 Survey on environmental radioactivity around the nuclear power plant and evaluation report, KHNP
Other countries: UNSCEAR [2008 Annual report]
Japan: Fukushima Pref. and TEPCO report 2010 (data period from April 1, 2010 to March 11, 2011)
Various concerns may induce reputational damage. Countermeasures should be constantly examined, by analyzing mechanism which creates such damage.

- **risk communication measures** for providing accurate information
- **economic measures** for preventing, suppressing, and compensating the reputational damage

### [consumption stage]
- [Agricultural, Forestry and Fishery Products]
  - conservative purchase
  - constantly refrained

### [distribution stage]
- [Wholesale/Retail]
  - Decrease in distribution volume
  - Price decrease
  - Stop distribution outlet pricing of brands

### [production stage]
- [Agricultural, Forestry and Fishery Products]
  - Import ban
  - Strengthen import measure/boycott movement

### [Domestic]
- Decrease in willingness for reconstruction
  - Suppression of production
  - decrease in willingness to produce

### [Overseas]
- [Agricultural, Forestry and Fishery Products]
  - [tourism industry]
    - Cancellation
- [tourism industry]
  - [Wholesale/Retail]
    - Cancellation

### Concerns
- **[Agricultural, Forestry and Fishery Products]**
  - Import ban
  - Strengthen import measure/boycott movement
  - [tourism industry]
    - Cancellation

- **[citizen]**
  - Evacuation/Temporary refuge
  - depopulation

- **[Wholesale/Retail]**
  - Decrease in distribution volume/Price decrease
  - Stop distribution outlet pricing of brands

- **[production stage]**
  - [Agricultural, Forestry and Fishery Products]
    - conservative purchase
    - constantly refrained

- **[decision on handling method]**
  - Start the disposal
    - lack of information

- **Concern for environmental around the site**
  - production stage
  - Suppression of production/decrease in willingness to produce

- **Concern for agricultural, forestry and fishery products around the site**
  - consumption stage
  - conservative purchase
  - constantly refrained

- **Concern for sluggish sales**
  - distribution stage
  - Decrease in attractiveness

- **Concern for agriculture, forestry and fishery products around the site**
  - Start the disposal
  - lack of information

- **Concern for environment around the site**
  - production stage
  - Suppression of production/decrease in willingness to produce

- **Concern for production stage**
  - [wholesale/retail]
    - Decrease in distribution volume/Price decrease
    - Stop distribution outlet pricing of brands

- **[production stage]**
  - [Agricultural, Forestry and Fishery Products]
    - conservative purchase
    - constantly refrained
As the handling of ALPS treated water is one of the measures for Fukushima Daiichi decommissioning, the handling of ALPS treated water needs to be completed by the end of decommissioning.

- To proceed decommissioning and reconstruction, considering reputational damage is important.

3 Basic Principles
(1) Isolating
(2) Preventing leakage
(3) Removing

- Purification of contaminated water/
  Suppression of contaminated water generation
- Completion of discharge of treated water/
  Dismantle of tanks
- Storage of treated water in tanks

Contaminated Water Management

- Removing fuel from the Spent Fuel Pool
- Fuel debris retrieval
- Ascertaining of the situation inside the PCV/consideration of fuel debris retrieval etc

Current progress

- Units 1 and 2
- Rubble removal
- Installation of fuel removal equipment
- Fuel removal
- Unit 3
- Fuel debris retrieval
- Storage/Transportation
- Unit 4
- Storage/Transportation
- Disassembly of reactor facility, etc
- Consideration of scenario and technologies
- Design and construction of equipment
- Dismantling and other tasks

[Ref. 7] Discussion at ALPS subcommittee (timeline)
**Ref. 8** Food safety: Trends in deregulation on Japanese food import regulations by each country/regions (Ministry of Agriculture, Forestry and Fisheries)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Country/region</th>
<th>Month, Year</th>
<th>Country/region</th>
<th>Summary of the relaxation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>Jun</td>
<td>Canada, Myanmar</td>
<td>Mar, Jun &amp; Nov 2018</td>
<td>USA</td>
<td>Lifted import ban on chestnut from Tochigi prefecture, fox jacopever, rockfish (<em>Sebastes cheni</em>) and seabass from Fukushima prefecture, ostrich ferns from Miyagi prefecture.</td>
</tr>
<tr>
<td></td>
<td>Jun</td>
<td>Serbia</td>
<td>Mar 2018</td>
<td>Russia</td>
<td>Lifted import ban on fishery products from 7 prefectures with test certificate requirement for fishery products from Fukushima prefecture.</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
<td>Chile</td>
<td>May 2018</td>
<td>United Arab Emirates</td>
<td>Lifted test report requirement for all food &amp; feed from 4 prefectures.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jul 2018</td>
<td>Singapore</td>
<td>Lifted import ban on all food and agricultural products (except for fishery and forest products) from 3 municipalities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Jul 2018</td>
<td>Hong Kong</td>
<td>Lifted import ban on some products from 4 prefectures with test certificate and certificate of exporter requirement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Nov 2018</td>
<td>China</td>
<td>Lifted import ban on rice from Niigata prefecture.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Russia</td>
<td>Lifted test certificate requirement for fishery products from Fukushima prefecture.</td>
</tr>
<tr>
<td>2012</td>
<td>Jan</td>
<td>Mexico</td>
<td>Mar 2019</td>
<td>Singapore</td>
<td>Lifted test certificate requirement</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>Peru</td>
<td>Apr 2019</td>
<td>USA</td>
<td>Lifted import ban on beef from Iwate and Tochigi prefecture, Japanese black porgy, surperch and starry founder from Fukushima prefecture, beef and Japanese black porgy from Miyagi prefecture.</td>
</tr>
<tr>
<td></td>
<td>Jun</td>
<td>Guinea</td>
<td>May 2019</td>
<td>Philippines</td>
<td>Lifted import ban on 4 fish species from Fukushima prefecture.</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
<td>Colombia</td>
<td>Jul 2019</td>
<td>United Arab Emirates</td>
<td>Lifted test report requirement for all food &amp; feed from Fukushima prefecture(except for fishery products and game meat).</td>
</tr>
<tr>
<td></td>
<td>Sep</td>
<td>Vietnam</td>
<td>Sep 2019</td>
<td>USA</td>
<td>Lifted import ban on brass blotched rockfish and scorpion fish from Fukushima prefecture.</td>
</tr>
<tr>
<td>2013</td>
<td>Mar</td>
<td>Malaysia</td>
<td>Oct 2019</td>
<td>Macau</td>
<td>Lifted test certificate requirement on some products from 9 prefectures changed to certificate of signature of Chamber of Commerce and Industries.</td>
</tr>
<tr>
<td></td>
<td>Apr</td>
<td>Ecuador</td>
<td>Nov 2019</td>
<td>EU*</td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
<td>Nepal</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>Mauritius</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td>2014</td>
<td>Jan</td>
<td>Iraq, Australia</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td>2015</td>
<td>May</td>
<td>Thailand (except 3 species of wild animals)</td>
<td>Mar 2019</td>
<td>Singapore</td>
<td>Lifted test certificate requirement</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
<td>Bolivia</td>
<td>Apr 2019</td>
<td>USA</td>
<td>Lifted import ban on beef from Iwate and Tochigi prefecture, Japanese black porgy, surperch and starry founder from Fukushima prefecture, beef and Japanese black porgy from Miyagi prefecture.</td>
</tr>
<tr>
<td>2016</td>
<td>Feb</td>
<td>India</td>
<td>May 2019</td>
<td>Philippines</td>
<td>Lifted import ban on 4 fish species from Fukushima prefecture.</td>
</tr>
<tr>
<td></td>
<td>May</td>
<td>Kuwait</td>
<td>Aug 2019</td>
<td>USA</td>
<td>Lifted test certificate requirement for all food &amp; feed from Fukushima prefecture(except for fishery products and game meat).</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
<td>Nepal</td>
<td>Dec 2019</td>
<td>EU*</td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>Mauritius</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td>2017</td>
<td>Apr</td>
<td>Qatar, Ukraine</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
<td>Pakistan</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Nov</td>
<td>Saudi Arabia</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td>2018</td>
<td>Feb</td>
<td>Turkey</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Jul</td>
<td>New Caledonia</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Aug</td>
<td>Brazil</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Dec</td>
<td>Oman</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td>2019</td>
<td>Mar</td>
<td>Bahrain</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
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<tr>
<td></td>
<td>Jun</td>
<td>Congo DR</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
<tr>
<td></td>
<td>Oct</td>
<td>Brunei</td>
<td></td>
<td></td>
<td>Lifted test certificate requirement for some products from some prefectures (including soybeans from Fukushima prefecture and fishery products from 6 prefectures).</td>
</tr>
</tbody>
</table>

* EFTA (Norway, Switzerland, Liechtenstein and Iceland) lifted their measures in line with EU

[Source: MAFF](http://www.maff.go.jp/j/export/e_info/pdf/kisei_keii_en.pdf)
About 150 people participated

[Ref. 9] Side event on Fukushima Daiichi Decommissioning & Food Safety at 63rd IAEA General Conference

<Side event on Fukushima Daiichi Decommissioning & Food Safety>
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html#iaea

Presentation topics at the side event:
(i) TEPCO: the current status of Fukushima Daiichi Decommissioning
(ii) IAEA: “the Peer-review mission” held in November 2018
(iii) METI: treated water issue and Fukushima reconstruction
(iv) MAFF: Food safety management
(v) OECD/NEA: “Symposium on Decommissioning/Reconstruction and Food Safety” held in March 2019.

<Information sheet “Face the Facts” illustrates...>

- Difference in Contaminated Water and Treated Water
- IAEA’s findings on Fukushima Daiichi
- Characteristics of Tritium and handling of treated water
- GOJ’s communication to the international community

Some argue that tritium in ALPS-treated water should be handled differently from tritium generated from usual operation of NPPs because the former is generated as the result of the accident.

No scientific reason can be found to differentiate the handling of the two.

Besides, it should be noted that operators of nuclear reactors globally discharge tritium into the sea and the atmosphere. In each country, there are regulations to manage liquid radioactive waste keeping public radiation dose less than 1mSv/year, based on ICRP (International Commission on Radiological Protection) publication.
Main findings

- IAEA team said Japan has made significant progress since the accident in March 2011, advancing from an emergency situation towards a stable situation now.

- The team acknowledged a number of accomplishments since the 2015 mission, including:
  - The repair of subdrains and construction of the frozen soil wall around reactor Units 1-4, which have reduced groundwater ingress into the reactor buildings.
  - Improved site working conditions including a reduced need for full protective gear, and real-time radiation monitoring easily accessed by the workforce.
  - Progress towards the removal of spent fuel from Units 1-3 as well as remote investigations of fuel debris by robots.

- The team said the Government of Japan, in engaging all stakeholders, should urgently decide on a disposition path for ALPS treated water. The treated water is accumulating in tanks on site and is expected to reach the currently planned tank capacity within three to four years.

* Totally 17 acknowledgements and 21 advisory points are provided in the preliminary summary report.
Decommissioning and Contaminated Water Management at TEPCO's Fukushima Daiichi NPS

Film, Fukushima Today 2019
- Efforts to Decommission and Reconstruction
https://www.youtube.com/watch?v=v_PeSp--Wuk

Film, Fukushima Today
- 8 years after the earthquake -
https://www.youtube.com/watch?v=pKjsSAz5Kws

Treated Water Portal Site
http://www.tepco.co.jp/en/decommission/progress/watertreatment/index-e.html

Observation Data, Fukushima Daiichi NPS
https://www7.tepco.co.jp/responsibility/decommissioning/1f_newsroom/data/index-e.html
Fukushima Daiichi Status Updates

[Ref.12] Information Portal site (2): Fukushima Daiichi NPS

Fukushima Daiichi Status Updates

https://www.iaea.org/newscenter/focus/fukushima/status-update

IAEA Review mission reports (Press release)

IAEA Team Completes Fourth Review of Japan’s Plants to Decommission Fukushima Daiichi (November 13, 2018)


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UNSCEAR 2016 REPORT Annex C

- Biological effects of selected internal emitters-Tritium