Events and highlights on the progress related to recovery operations at TEPCO's Fukushima Daiichi Nuclear Power Station

October 2020

The Government of Japan

Section 1: Summary of updates from June 2020 through August 2020

1.1: Decommissioning and Contaminated Water management

Since the last report, there has been progress on the decommissioning and contaminated water management at TEPCO's Fukushima Daiichi Nuclear Power Station (hereinafter "Fukushima Daiichi NPS") as detailed below. For specifics please refer to section 2.

1. Equipment being developed toward starting trial fuel debris retrieval of the Unit 2
   Toward starting the trial retrieval of Unit 2 fuel debris scheduled in 2021, retrieval equipment is being developed in the UK. In the trial retrieval plan, a robot arm will be used to access the PCV to collect fuel debris. (For further details please refer to Page 13.)

2. Treatment completion of temporarily stored "Sr-reduced water"
   In the past, "Sr-reduced water" that had been temporarily stored in the storage tanks as awaiting treatment by ALPS (Advanced Liquid Processing System) was completely treated by August 8. (For further details please refer to Page 9.)

3. Steady progress in Unit 3 fuel removal
   Fuel removal from Unit 3 proceeded as planned. As of August 29, 322 fuel assemblies were removed. Work continues with safety first to complete fuel removal by the end of FY2020. (For further details please refer to Page 14.)

4. Revision of the Solid Waste Storage Management Plan
   The fourth revision of the "Solid Waste Storage Management Plan," which was formulated in March 2016, was issued on July 30. (For further details please refer to Page 15.)

5. Meetings as Opportunities for Receiving Opinions
   The government of Japan held the 4th and 5th "Meetings as Opportunities for Receiving Opinions" on June 30 and July 17 respectively. (For further details please refer to Page 19.)

6. Thorough COVID-19 countermeasures implemented to continue work
   Countermeasures are being implemented to prevent the COVID-19 infection spreading at the Fukushima Daiichi NPS. No significant influence on work, such as delays to the work processes, was identified. (For further details please refer to Page 16.)

1.2: Monitoring results

There were no significant changes in the monitoring results of air dose rates, dust, soil, seawater, sediment and marine biota during the period from June 2020 to August 2020. For further details please refer to the section 3.

1.3: Off-site decontamination

The Ministry of the Environment (MOE) completed the whole area decontamination in the Special Decontamination Area (SDA) by the end of March 2017 as planned, while decontamination conducted by the municipalities in the Intensive Contamination Survey Area (ICSA) was also completed in March 19th, 2018. This means that the whole area decontamination based on the Act on Special Measures was completed, excluding "Difficult-to-Return Zones" (DRZ). For further details please refer to the section 4.

1.4: Food products

Monitoring and inspections of radioactive materials in food are continuously being conducted, and restrictions on food distribution and the removal of these restrictions are taken based on monitoring results. Restrictions on several agricultural products and fishery products were lifted during the period from June to August 2020.

According to the monitoring results of fishery products in marine fish species, from May to July 2020, the excess ratio* was 0% (total: 2,248samples). In freshwater fish species, the excess ratio was 0.3 % (No sample is exceeding 100 Bq/kg out of 712 samples (total)). For further details please refer to the section 5.

*excess ratio: (Number of samples containing more than 100 Bq/kg) / (Total number of samples)

1.5: Radiation protection of worker

The Ministry of Health, Labour and Welfare (MHLW) has provided guidance on the prevention of radiation hazards to workers engaged in the decommissioning work at Fukushima Daiichi NPS or decontamination and related work; additionally, the Ministry has taken relevant and necessary measures such as the provision of long-term healthcare for emergency workers. For further details please refer to the section 6.

Section 2: Decommissioning and contaminated water management at Fukushima Daiichi NPS

2.1: Mid-and-Long Term Roadmap

Decommissioning work at Fukushima Daiichi NPS has been conducted by the following milestones described in the "Mid-and-Long Term Roadmap" with safety as the priority.

The entire decommission process will take 30 to 40 years, and the volume of tasks is gigantic. Therefore, the Government of Japan and TEPCO have prioritized each task and set the goal to achieve them.

Mid-and-Long-Term Roadmap towards the Decommissioning of Fukushima Daiichi NPS (revised on December 27, 2019)

<Outline of the Mid-and –Long-Term Roadmap>
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20191227_1.pdf

<The Mid-and-Long-Term Roadmap>
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20191227_3.pdf

Major milestones

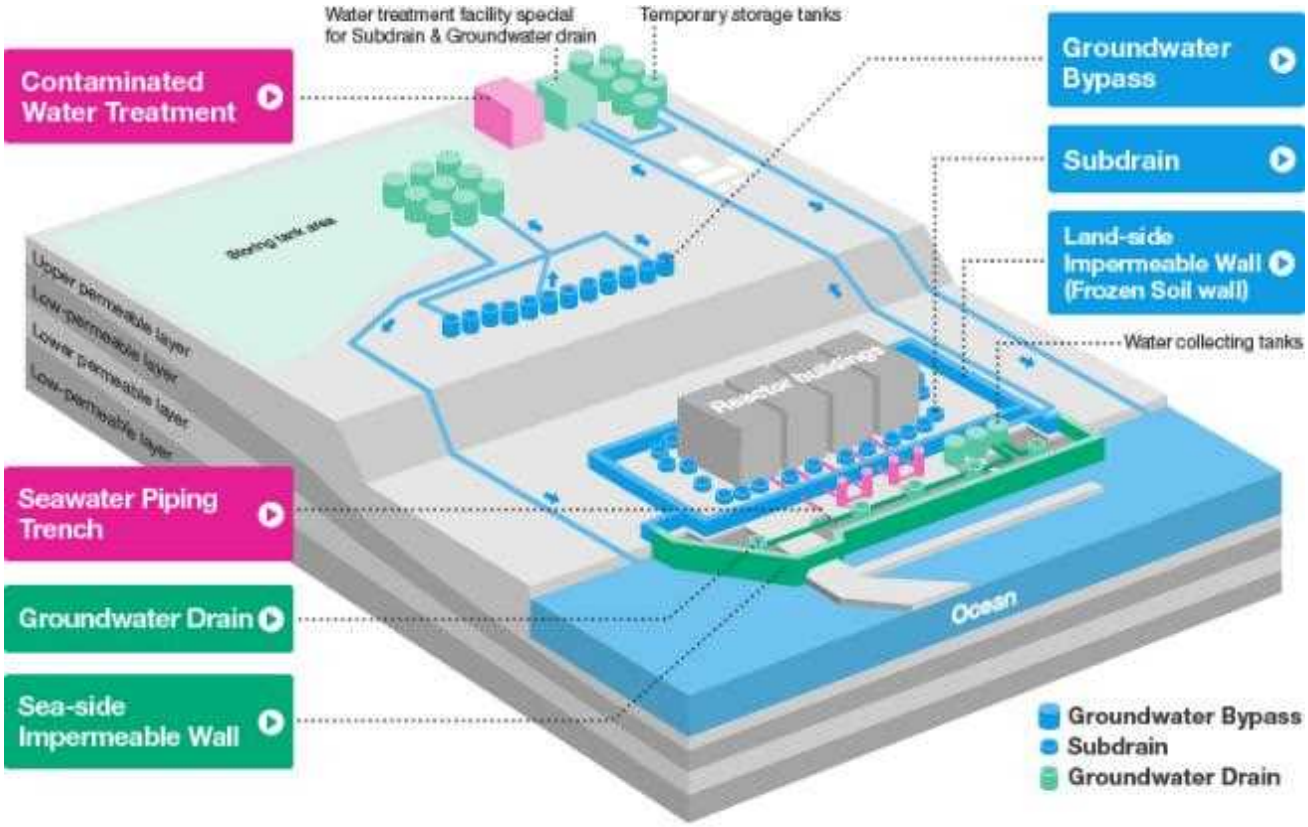
		Roadmap (Sept. 2017)	Revised Roadmap	
Contaminated water management	Reduce to about 150 m³/day **Reduce to about 100m³/day or less** (Further reduction of generation)	Within 2020 –	Within 2020 **Within 2025**	NEW
Stagnant water removal / treatment	Complete stagnant water removal / treatment in buildings* * Excluding the reactor buildings of Units 1-3, Process Main Buildings, and High Temperature Incineration building.	Within 2020	Within 2020(*)	
	Reduce the amount of stagnant water in reactor buildings to about a half of that in the end of 2020	–	**FY2022 - 2024**	NEW
Fuel removal	**Complete of fuel removal from Unit 1-6**	–	**Within 2031**	NEW
	Complete of installation of the large cover at Unit 1	–	**Around FY2023**	NEW
	Start fuel removal from Unit 1 (Methods have changed to ensure safety and prevent dust scattering)	Around FY2023	**FY2027 – 2028**	REVISED
	Start fuel removal from Unit 2	Around FY2023	**FY2024 - 2026**	REVISED
Fuel debris retrieval	Start fuel debris retrieval from the first Unit (Start from Unit 2, expanding the scale gradually)	Within 2021	Within 2021	
Waste management	Technical prospects concerning the processing/disposal policies and their safety	Around FY2021	Around FY2021	
	Eliminating temporary storage areas outside for rubble and other waste	–	**Within FY2028**	NEW

* Excluding the reactor buildings of Units 1-3, process main buildings, and High temperature incineration building.

2.2: Water management

1. Major initiatives for water management

The preventive and multi-layered measures against contaminated water issue are implemented based on the three principles; ”Removing contamination sources”, ”Redirecting ground water from contamination source” and “Preventing leakage of contaminated water”.



Source: TEPCO

(1) Groundwater bypass

(a) Objective

The groundwater bypass function is to isolate water from contamination by pumping it and reducing its inflow into the reactor buildings.

(b) Mechanism

Clean groundwater is pumped from the wells installed on the mountain-side area of the reactor buildings and then discharged into the port area after confirming that water quality met the operational targets.

(c) Recent situations

As of August 26, 2020, 578,819m³ of clean groundwater was released into the ocean. The pumped-up groundwater was temporarily stored in tanks and released after TEPCO and a third-party organization had confirmed that the quality met the operational targets. The pumps are inspected and cleaned as necessary to operate appropriately.

The result of sea area monitoring shows that the radiation level of seawater outside the port area remains low enough compared to the density limit specified by the Reactor Regulation and WHO guidelines for drinking water quality, in addition significant change in the radioactivity has not been observed.

TEPCO's website related to groundwater bypass:

http://www.tepco.co.jp/en/decommision/planaction/groundwater/index-e.html

Detailed analysis results regarding the water quality of the groundwater being pumped out for by-passing at Fukushima Daiichi NPS (published by Ministry of Economy, Trade and Industry (METI))

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202007.pdf
(June 2020)
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202008.pdf
(July 2020)
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202009.pdf
(August 2020)

(2) Subdrain and groundwater drain systems

(a) Objective

The function of the subdrain system is to prevent clean groundwater from being contaminated by pumping it and reducing its inflow into the reactor buildings, and thus it is reducing the generation of contaminated water.

The function of the groundwater drain system is to prevent leakage of contaminated groundwater by pumping it before flowing into the port.

(b) Mechanism

Groundwater that contains slight radioactivity is pumped from the wells installed in the vicinity of the reactor buildings (called subdrain) and the wells installed in the bank protection area (called groundwater drain) and then the groundwater treated through special purification equipment to meet the stringent operational targets set by TEPCO. The purified groundwater is discharged into the port area after passing water quality inspections.

(c) Recent situations

The operation of the subdrain and groundwater drain systems started in September 2015. The effects of the subdrain system are measured by two markers: the water level of the subdrain, and the difference between the water level of the subdrain and that of the reactor buildings.

Up until August 26, 2020, 961,702m^3 was drained after TEPCO and a third-party organization confirmed that the quality met the operational targets. The result of sea area monitoring confirms that the radiation level of seawater outside the port area remains low enough compared to the density limit specified by the Reactor Regulation, and no significant change in the radioactivity level has been observed.

TEPCO's website related to the subdrain and groundwater drain systems:

http://www.tepco.co.jp/en/decommision/planaction/sub-drain/index-e.html

Detailed analysis results regarding the water quality of the groundwater pumped up by sub-drain and purified at Fukushima Daiichi NPS (published by METI)

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202004.pdf
(June 2020)
https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202008.pdf
(July 2020)

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/sd202009.pdf
(August 2020)

(3) Land-side impermeable wall (Frozen soil wall)

(a) Objective

The installation of the land-side impermeable wall aims to prevent clean groundwater from being contaminated. This will be achieved by surrounding the reactor buildings with an in-ground frozen barrier and blocking groundwater from flowing into the buildings.

(b) Mechanism

An approximately 1,500 meters long wall, composed of frozen pipes driven into the ground, surrounds the Unit 1-4 reactor buildings. The barrier will be formed around the buildings to block groundwater inflow by supplying chilled brine (a freezing material) through the pipes and freezing the soil.

(c) Recent situations

An operation to maintain the land-side impermeable walls and to prevent the frozen soil from thickening, further continued from May 2017 on the north and south sides and started from November 2017 on the east side. On these sides, sufficient thickness of frozen soil was confirmed. The area of the maintenance operation was expanded in March 2018.

In March 2018, the construction of the land-side impermeable walls was completed, except for a portion of the depth, based on a monitoring result showing that the underground temperature declined below 0 ℃ in almost all areas, while, on the mountain side, the difference between the inside and outside increased to approx. 4-5 m. The 21st Committee on Countermeasures for Contaminated Water Treatment, held on March 7, 2018, which evaluated that together with the function of subdrains, etc., a water-level management system, which keeps groundwater isolation from the buildings, had been established and it had allowed a significant reduction in the amount of contaminated water generated.

A supplementary method was implemented for the unfrozen depth and it was confirmed that the temperature of this portion declined below 0 ℃ by September 2018.

The groundwater level in the area inside the land-side impermeable walls declined every year. Even in the case of Typhoon No.19 (Hagibis), the average water level difference inside and outside the frozen wall in mountain-side was 2 to 3 meters, and the groundwater level in the revetment area was kept at t.p.1.9m.

TEPCO's website related to the land-side impermeable wall:

http://www.tepco.co.jp/en/decommision/planaction/landwardwall/index-e.html

(4) Sea-side impermeable wall

(a) Objective

The installation of the sea-side impermeable wall aims to prevent the leakage of contaminated water into the ocean. This was achieved by installing a wall to block groundwater from flowing into the port area, and thus protecting the marine environment against pollution.

(b) Mechanism

A wall, approximately 780 meters long and composed of 594 steel pipes with a diameter of 1.1 meters and a length of 30 meters, were installed around the bank protection area near the reactor buildings. The groundwater flowing from the site is blocked by the wall and pumped by the subdrain and the groundwater drain systems. Consequently, the wall prevents groundwater from flowing into the port area and also reduces the risk of contaminated water flowing into the ocean in case of any leakage.

(c) Situations

In October 2015, the sea-side impermeable wall construction was completed. It has been confirmed that the radiation level of seawater inside the port area substantially decreased. In addition to the operation of the subdrain and the groundwater drain systems, the completion of the wall marks major progress in water management at Fukushima Daiichi NPS.

TEPCO's website related to the sea-side impermeable wall:

http://www.tepco.co.jp/en/decommision/planaction/seasidewall/index-e.html

(5) Completion of waterproofing and closure work of seawater piping trench

Highly concentrated contaminated water was generated because of the accident and it became stagnant inside the seawater piping trench of Unit 2, 3 and 4. In order to prevent the risk of the contaminated water leaking into the ocean, the stagnant water was removed and the seawater piping trench was waterproofed.

The work at Unit 2 was completed in 2017, following the work at Unit 3 and 4, which was completed in 2015. No stagnant water inside the seawater piping trench is in each unit.

(6) Progress of stagnant water treatment in buildings

To reduce the risk of stagnant water leaking from buildings, water levels in the Unit 1-4 buildings are being lowered sequentially. The connecting part between Unit 1 and 2 was separated on September 13, 2018.

Separation of the connecting part between Unit 3 and 4 was completed in December 2017. Based on these results, the milestone (a main target process) of "separating the connecting parts between Unit 1 and 2, and Unit 3 and 4 (by the end of 2018)" in the Mid- and Long-Term Roadmap was achieved. This separation enables to manage stagnant water by each unit. Water levels in buildings will continue to be lowered sequentially towards the completion of stagnant water treatment in buildings within 2020 (excluding the reactor buildings of Units 1-3, process main buildings, and High temperature incineration building).

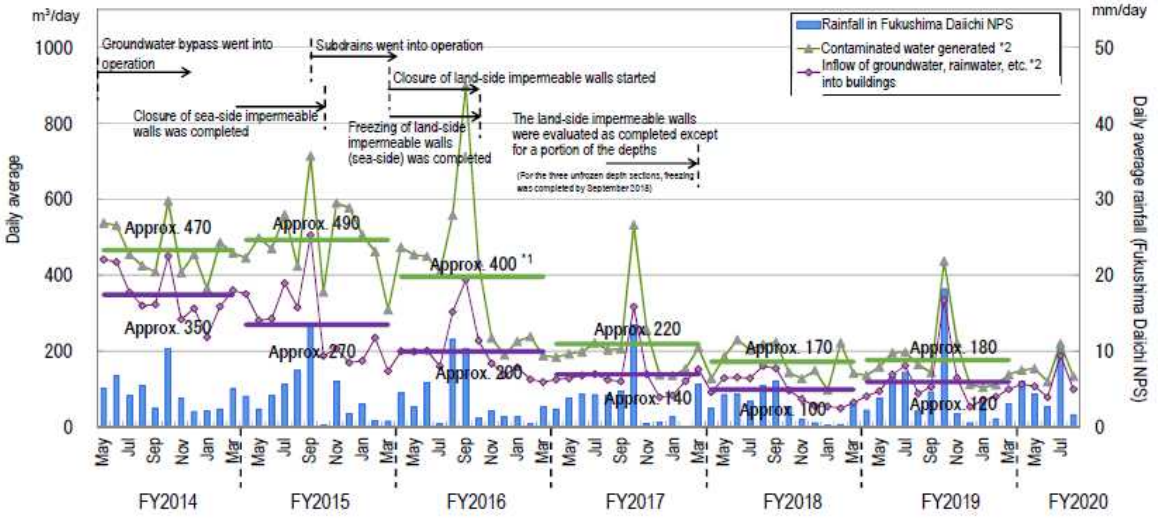
(7) Control of the generation of contaminated water

Multi-layered measures, including pumping up by subdrains and land-side impermeable walls, which were implemented to control the continued generation of contaminated water, reduced the groundwater inflow into buildings.

Following the steady implementation of measures (groundwater bypass, subdrains, land-side impermeable walls, etc.), the inflow of the groundwater and rainwater into buildings reduced from approx. 350 m^3/day (in FY2014) to approx. 120 m^3/day (in FY2019), though it depends on rainfall.

Subsequently, the generation of contaminated water decreased from approx. 470 m^3/day (in FY2014) to approx. 180 m^3/day (in FY2019).

Measures will continue to further reduce the volume of contaminated water generated.



*1 Values differ from those announced at the 20th Committee on Countermeasures for Contaminated Water Treatment (held on August 25, 2017) because the method of calculating the contaminated water volume generated was reviewed on March 1, 2018. Details of the review are described in the materials for the 50th and 51st meetings of the Secretariat of the Team for Countermeasures for Decommissioning and Contaminated Water Treatment.

*2: The monthly daily average is derived from the daily average from the previous Thursday to the last Wednesday, which is calculated based on the data measured at 7:00 on every Thursday.

2. Purification treatment of contaminated water and management of treated water

(1) Objective

The purification treatment of contaminated water aims to remove sources of contamination.

(2) Mechanism

Contaminated water that accumulated at the site of Fukushima Daiichi NPS is treated at multiple facilities including Multi-nuclide Removal Facility (Advanced Liquid Processing System = ALPS). In this process, after the concentration of caesium and strontium in the contaminated water is reduced, ALPS removes most of the radioactive materials except tritium and radioactive materials are reduced to about one millionth, compared to the water before purification.

(3) Recent situations

As of August 20, 2020, the volumes treated by existing, additional and high-performance multi-nuclide removal equipment were approx. 454,000, 678,000 and 103,000 m^3, respectively.

To reduce the risks of strontium-treated water, treatment using existing, additional and high-performance multi-nuclide removal equipment has been underway. As of August 20, 2020, approx. 756,000 m^3 had been treated.

TEPCO's website related to purification treatment of contaminated water:

http://www.tepco.co.jp/en/decommision/planaction/alps/index-e.html

ALPS treated water, which is treated to remove most of the radioactive materials except tritium, is stored in tanks located on the hill at the site. The total amount of the ALPS treated water is approx. 1.23 million tons as of August 20, 2020.

Contaminated water extracted from the reactor building is first reduced of cesium and strontium by cesium adsorption apparatus (this water is called "Sr-reduced water "), and then purified by ALPS (Advanced Liquid Processing System). It is stored in the tank as ALPS treated water.

In the past, ALPS treatment could not keep up with the amount of contaminated water generated, so it was temporarily stored in a storage tanks as awaiting treatment by ALPS. Sr-reduced water in this storage tanks was treated by ALPS in order to reduce the storage risk, and the treatment was completed on August 8 (except for operation tanks necessary to treat the contaminated water generated daily). The empty storage tanks used for Sr-reduced water will be reused as a tanks for ALPS treated water after decontamination.

(4) Management of treated water

Within the scope of the current construction plan, the tanks storing the ALPS treated water are expected to be full around the summer of 2022. A series of advisory committees of the Government of Japan have been studying the solution to the problem of contaminated water, including handling of ALPS treated water, since 2013.

On 27 September 2016, the Committee on Countermeasures for Contaminated Water Treatment established the ALPS Subcommittee on Handling ALPS Treated Water (hereinafter referred to as the “ALPS Subcommittee”) to discuss the handling of the ALPS treated water from a wide-range of viewpoints, including societal perspectives, based on the options presented in the Tritiated Water Task Force Report. The ALPS Subcommittee published the report of its findings on 10 February 2020. The ALPS Subcommittee concluded its report to show available options for disposal of the ALPS treated water and submitted it to the Government of Japan. The report outlines the potentially available options for the disposal of the ALPS treated water.

3. Fuel removal from the reactor buildings

(1) Basic information

At the time of the accident in March 2011, the nuclear power station operator of Unit 1, 2 and 3 were unable to maintain the cooling of the reactor cores due to power loss. This resulted in the generation of a huge amount of hydrogen gas from the melted fuel. The pressure in the containment buildings continued to increase from the accumulation of hydrogen which eventually caused hydrogen explosions in Units 1, 3 and 4, resulting in structural damage. However, since November 2011, the nuclear power station operator has been maintaining these units in a stable condition with no significant release of radioactive material to the environment.

The most important tasks in the decommissioning process are the fuel removal from the spent fuel pools and the retrieval of fuel debris (melted and solidified fuel) from the Primary Containment Vessels (PCV). Currently, various measures are being implemented in order to make progress towards these goals, including removal of rubble accumulated in the buildings and investigation of the condition inside the PCV through the use of state-of-the-art technologies.

(2) Unit 1

In July 2015, TEPCO started to dismantle the building cover of the reactor building as a step towards starting fuel removal from the spent fuel pool (SFP). In October of the same year, the removal of roof panels was completed without any significant change in radiation dose rates around the reactor building. The removal work of the roof panels proceeded carefully and anti-scattering measures were implemented to reduce the spread of contamination. In September 2016, dismantling of wall panels (18 in total) began and was completed in November of the same year. Installation of windbreak fences to further reduce dust scattering during rubble removal from the operating floor was completed on December 19, 2017, and the removal of the rubble on the operating floor started on January 22, 2018. No significant variation attributable to this work has been identified at the dust monitors installed on the workplace and near the boundary of the site. Before formulating a plan to remove rubble around the SFP, an onsite investigation started from July 23, 2018 and was completed on August 2, 2018. To create an access route for preparatory work to protect the SFP, etc., work to remove four sections of X-braces (one each on the west and south sides and two on the east side, respectively) started from September 19, 2018 and all four planned sections had been removed by December 20, 2018. On March 6, 2019, the creation of an access route from the west working floor was completed and the floor opening was covered to prevent small rubble falling from the operating floor during the work. From March 18, 2019, the removal of small rubble using pliers and suction equipment in the east-side area around the SFP was underway. From April 2, 2019, rubble removal in the same area began using a remote-controlled heavy machine.

With regard to fuel removal from the SFP, before removing the fallen roof on the south side, the surface of the SFP will be covered by a bag filled with air mortar. In preparation, the transparency of the pool water was investigated on August 2 and September 27 2019. The investigation confirmed that by installing lightning and a scope to create an environment to investigate the upper part of the pool using an underway camera, a view of approx. 7 meters would be available. This investigation also detected an accumulation of rubble on the upper surface of the fuel rack in a part of the cables of the fuel-handling machines submerged in water.

Before retrieving fuel debris, an investigation of the condition inside the PCV was commenced. From February to May 2015, TEPCO investigated the inside of the PCV by using “muon”, a kind of cosmic rays, and studied the condition of fuel debris inside. In addition, in April 2015, TEPCO sent robots into the PCV to investigate and collect important information such as radiation level and temperature and also took images from inside. Based on the results of the investigation in April 2015, the status of debris spreading to the basement floor outside the pedestal was inspected using a self-propelled investigation device from March 18 to 22, 2017. The purpose of the investigation was to identify the status inside the Unit 1 PCV and to make progress towards fuel debris retrieval. In this investigation, cameras and a robot were inserted into the PCV by remote control. A dosimeter and an underwater camera were suspended from the 1st floor, where grid-like scaffold is installed, to collect information to infer the distribution of fuel debris.

The investigation identified that the existing structures such as steel or valves did not suffer severe distortion and damage. In addition, deposits of constant thickness were confirmed at the PCV bottom. There has been no effect to the surrounding environment, and no significant change was identified in the monitoring data due to the investigation.

As part of the work to create an access route for the internal investigation of the Primary Containment Vessel (PCV), scheduled for the first half of FY2019, drilling on the outside of X-2 penetration, a penetration with doors through which workers enter or exit the PCV, started on April 8, 2019, and the inner door of the X-2 penetration, which included doors through which workers entered or exited the PCV, was drilled (for about five minutes) on June 4, 2019. Monitoring data during this work showed no significant change.

Concerning fuel removal from the spent pool, the well plug, which is considered as having been misaligned from the normal position due to the influence of the hydrogen explosion at the time of the accident, was investigated during the period of July 17 to August 26 2019, by taking photos using a camera, measuring the air-dose rate, and collecting 3D images.

The investigation checked the positional relation of the upper and intermediate plugs, detected an inclination of the plug and confirmed that the air-dose rates peaked near the plug centre.

In order to resume the access route construction for the internal investigation of the Primary Containment Vessel (PCV), examination is underway based on the data acquired thus far to optimize the cutting time and monitor the dust density near the PCV more intensively. Specifically, the additional of a dust monitor using piping installed near the PCV head was considered.

Toward investigating the inside of the Unit 1 PCV, an access route is being constructed. Creation of the three holes in the inner door was completed on April 22, 2020.

(3) Unit 2

As for Unit 2, a hydrogen explosion did not occur and therefore the building remained undamaged. However, TEPCO concluded that it would be better to dismantle the upper part of the reactor building to help facilitate the fuel removal from the spent fuel pool. Currently, TEPCO is proceeding with preparation work, such as the removal of rubble around the reactor the building and building of scaffolding.

On November 6, 2018, before the investigation into formulating a work plan to dismantle the Reactor Building rooftop, etc., work to move and contain the remaining objects on the operating floor (1st round) was completed. On February 1, 2019, an investigation into measuring radiation doses on the floor, walls and ceiling inside the operating floor and confirm the contamination status was completed. After analysing the investigative results, the “contamination density distribution” throughout the entire operating floor was obtained,

based on which the airborne radiation dose rate inside the operating floor could be evaluated. A shielding design and measures to prevent radioactive material scattering, etc. will be examined. From April 8, 2019, work to move and contain the remaining objects on the operating floor (2nd round), such as materials and equipment which may hinder fuel removal work commenced. The 2nd round included placing the remaining objects in the container and cleaning the floor to suppress dust scattering, all of which were not scheduled in the 1st round. The status of dust density, etc. is being monitored to steadily implement the work with safety first.

An investigation to capture the location of fuel debris inside the Unit 2 was conducted from March 22 to July 22, 2016. This operation applied the muon transmission method of which effectiveness was demonstrated in its appliance for locating the debris inside Unit 1. These operations used a small device developed through the "Development of Technology to Detect Fuel Debris inside the Reactor" project funded by a government subsidy.

The results of the investigation indicate that high-density materials which are considered as fuel debris are at the bottom of the RPV as well as the lower part and outer periphery of the reactor core. It is assumed that most of the fuel debris existed at the bottom of the RPV.

An investigation inside the Unit 2 PCV has been conducted to identify the status of debris inside the RPV pedestal (The base supporting the RPV). From 26 January to 16 February 2017, a camera and a robot were inserted closely to the RPV by remote control. The internal situation was understood through the digital images. From the result of this investigation, fallen scaffolding below the RPV and the status of deposits were identified directly for the first time. Moreover, the actual radiation dose rate and temperature inside the PCV was measured resulting in big progress towards the decommissioning of Fukushima Daiichi NPS.

On January 19, 2018, the status below the platform inside the pedestal was inspected using an investigative device with a hanging mechanism. From the analytical results of images obtained during the investigation, deposits which probably included fuel debris were found at the bottom of the pedestal.

On February 13, 2019, a contact investigation on the detected deposits inside the PCV was conducted to determine their characteristics (hardness, fragility, etc.). This contact investigation confirmed that the pebble-shaped deposits, etc. could be moved and that hard rock-like deposits that could not be gripped may exist. In addition, images of radiation dose and temperature data that would help determine the contour and size of the deposits could be collected by moving the investigative unit closer to the deposits. The result of this investigation will be utilized in the internal investigation in the second half of FY 2019, examination of the retrieval method.

Image: Before and while touching the deposit at the investigation of Unit 2

Regarding retrieval of fuel debris, toward starting the trial retrieval of Unit 2 fuel debris scheduled in 2021, retrieval equipment is being developed in the UK. In the trial retrieval plan, a robot arm will be used to access the PCV, obstacles inside the PCV will be removed by the cutting equipment and powder fuel debris will be collected by metal-brush type adhering equipment or vacuum-container type suction equipment. For remotely operated work in a severe environment with high exposure to radiation and within a confined space, tests and training will be implemented using a realistic mock-up in advance and work will be implemented steadily with safety first. Fuel debris retrieved from the trial will be placed in closed metal transportation casks to be transported to the existing analysis facility.

During the period April 2-16, 2019, a water injection reduction test (STEP 1) was conducted. Through this test, the water injection rate into the reactor was temporarily changed for check the temperature variation, in order to take the heat release in the air into consideration. When the water injection rate was changed from 3.0 to 1.5 m^3/h, the maximum temperature increase at the RPV bottom was up by 5℃ from about 20℃ at the test start. It was confirmed that the overall temperature variation, including other parameters, was almost within predictions.

To optimize the emergency response procedures, a test (STEP 2) involving temporarily suspending water injection to the reactor (3.0 to 0.0 m^3/h) was conducted on May 13 2019 (and terminated on May 24, 2019). The graph below shows the changes in RPV bottom temperature during the test to suspend water injection to the reactor. The test confirmed that the temperature increase rate at the RPV bottom was at the same level of 0.2℃/h or less as predicted and that the temperatures at the RPV bottom and inside the PCV during the test also varied almost within expectations. No abnormality was detected in other parameters such as the dust density. The difference between the prediction data and the test data and the behavior variation depending on the location where the thermometer was installed will be evaluated to utilize the results in optimizing emergency response procedures.

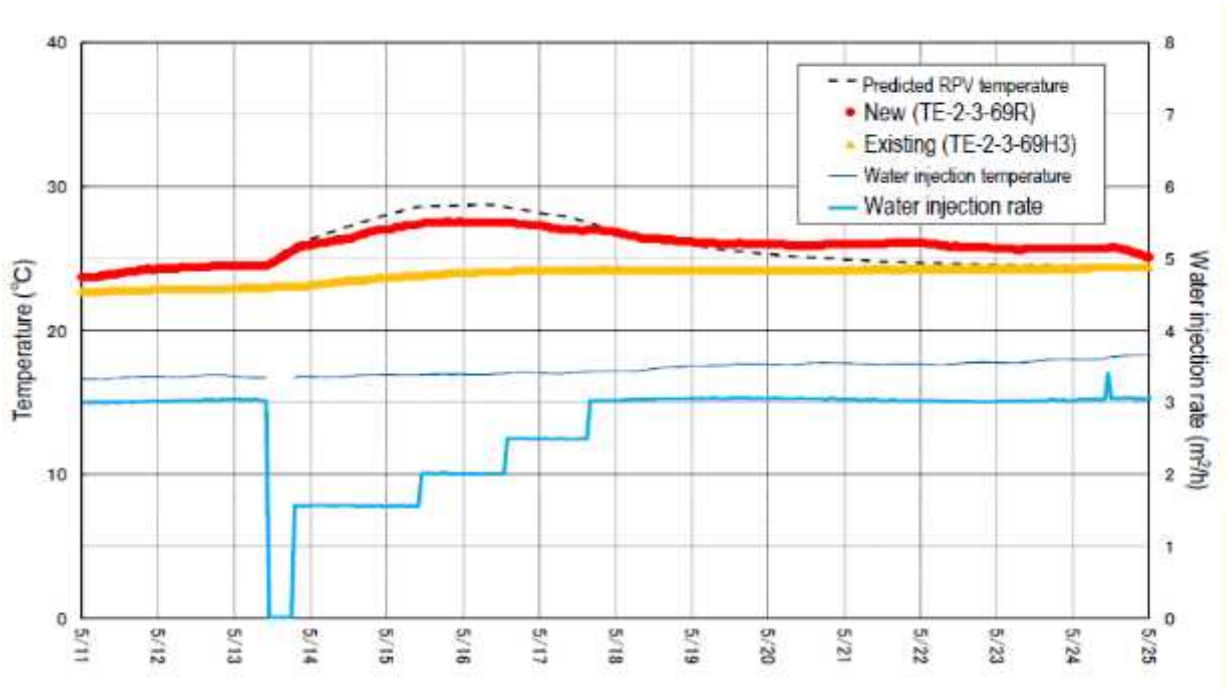


Figure. Changes in PRV bottom temperature during the test to suspend water injection

(4) Unit 3

In August 2015, TEPCO completed the removal of the Fuel Handling Machine (FHM) rubble from the spent fuel pool. By the end of November 2015, all rubble remaining in the pool was removed. Equipment to cover the upper part of the building as well as a crane has been installed since August 2017 to start removing spent fuel from the pool.

Regarding the FHM and crane, consecutive defects have occurred since the test operation started on March 15, 2018. On September 29, 2018, to determine the risks of defects in fuel-handling facilities, the FHM was temporarily recovered and a safety inspection (operation check and facility inspection) started. For 14 defects detected in the safety inspection, measures were completed on January 27, 2019. On February 8, 2019, a function check after cable replacement was completed.

From April 15, 2019, removal of 566 fuel assemblies including 52 non-irradiated fuel assemblies stored in the spent fuel pool started. As of August 29, 2020, 322 assemblies including 52 non-irradiated fuel assemblies were removed from Unit 3.

Concurrent with the above activities, investigation of the current condition inside the PCV is underway. In October 2015, robots were sent into the PCV and successfully collected useful information. The images taken by the robots confirmed that the main structure and walls inside the PCV had not been damaged.

The image inside of the pedestal was acquired by using underwater ROV from 19 to 22, July 2017. As a result, in the pedestal it was confirmed that there was solidified molten materials and damage to some parts of the structure such as housing support and grating. In November 2017, analysis of image data obtained during the investigation was released. It identified damage to multiple structures and the supposed core internals.

Investigation using the muon cosmic ray to identify the existence of fuel debris has been implemented from May to September 2017. The final report was presented and there is no large mass of fuel debris in the core of the RPV.

To understand the overall picture inside the pedestal, videos obtained while investigating inside Unit 3 PCV in July 2017 were reproduced in 3D. Based on the reproduced images, the relative positions of the structures, such as the rotating platform slipping off the rail with a portion buried in deposits, were visually understood.

To optimize the emergency response procedures at the time when water injection to the reactor is suspended, a test involving temporarily suspending water injection to the reactor was conducted at Unit (suspension period: February 3–5, 2020 (approx. 48 hours*)).

(*The test continued until February 17, including the period of sequentially recovering the injection volume after the suspension.)

The increase in temperature during the suspension period was almost within the assumed range with increases of approx. 0.6 and 0.7 ℃C at the RPV bottom and PCV respectively. In addition, no abnormality was detected in the dust density of the PCV gas control facility and other parameters. The difference between the obtained results and the assumption will be evaluated to help examination toward optimizing emergency response procedures.

(5) Unit 4

Despite a hydrogen explosion, the fuel assemblies of Unit 4 were not damaged, as the nuclear power station was in cold shutdown status and all the fuel had been stored in the spent fuel pool before the accident. The fuel assemblies in the pool were taken out and transferred to the common pool located within the station site. This fuel removal operation started on November 2013 and was safely completed in December 2014. Fully utilizing this

successful experience, the fuel assemblies remaining in the spent fuel pools of Units 1, 2 and 3 will be removed.

(6) Unit 5 and 6

These reactors were not operating at the time of the accident, but the fuel remained in the reactor. In addition, unlike the case of Units 1, 2 and 3, the reactors of Unit 5 and 6 did not encounter power loss and the reactor cores were successfully cooled off.

Given that the conditions of the buildings and the equipment for storing the fuel are stable and risks of causing any problem in the decommissioning process are estimated to be low compared to the other Units, the fuel assemblies of Units 5 and 6 are safely stored in the spent fuel pool in each building for the time being. The next step will be to carefully remove fuel from the spent fuel pools without impact on fuel removal from Units 1, 2 and 3.

(7) Completion of dismantling plan for the Unit 1/2 exhaust stack

Regarding work to dismantle the Unit 1/2 exhaust stack, which started from August 1, 2019 and was entrusted to Able Co., Ltd., the scheduled dismantling from a height of 120m to 59m was completed by April 29. On May 1, a lid was subsequently installed on top of the stack to prevent rainwater infiltration and all processes of the work were completed. This work improved the seismic tolerance of the exhaust stack and reduced risks.

4. Waste management

As of the end of August 2020, the total storage volume of the concrete and metal rubble was approx. 299,700 m³ (+2,000 m³ compared to the end of June, with an area-occupation rate of 72%). The total storage volume of trimmed trees was approx. 134,400 m³ (with an area-occupation rate of 77%). The total storage volume of used protective clothing was approx. 32,300 m³ (-3,500 m^3, with an area-occupation rate of 47 %). The increase in rubble was mainly attributable to tank-related work, while the decrease in used protective clothing the acceptance to was incinerate used protective clothing.

As of August 6, 2020, the total storage volume of waste sludge was 421 m³ (area-occupation rate: 60%), while that of concentrated waste fluid was 9,380 m^3 (area-occupation rate: 91%). The total number of stored spent vessels, High-Integrity Containers (HICs) for multi-nuclide removal equipment, etc., was 4,886 (area-occupation rate: 77 %).

The fourth revision of the “Solid Waste Storage Management Plan,” which was formulated in March 2016, was issued on July 30, 2020. Specifically, the estimated amount of solid waste to be generated in the next decade or so was updated from approx.770,000 to 780,000 m³ and the lack of any influence on the facility installation schedule was confirmed. Based on this plan, for rubble and other solid waste temporarily stored in the outdoor storage area, combustibles will be incinerated, metals cut and concrete broken. After minimizing the amount, solid waste will be integrated in the indoor storage as part of work toward achieving the target milestone in the Mid-and-Long-Term Roadmap “eliminating the temporary outdoor storage area within FY2028.”

5. Working environment

In order to achieve a long-term decommissioning, it is important to ensure a stable workforce (about 3,400-4,400 workers per day after 2018FY). TEPCO has implemented the improvement of the working environment such as (1) providing warm food, (2) setting up a large rest area, and a convenience store, (3) developing emergency medical facilities and

systems, and ensuring workplace safety which starts from the reduction of radiation exposure. By the decontamination work including pavement and contaminated water management, the ordinary clothing area which does not require wearing protective clothing and full-faced masks, is expanded to about 96% of the site.

Considering the latest situation, countermeasures are being implemented to prevent the COVID-19 infection spreading, such as requiring employees to take their temperature prior to coming the office, wear masks at all times and avoid the "Three Cs" (Closed spaces, Crowded places, Close-contact settings) by shift-use of the rest house, etc. No significant influence on work, such as a delay to the work processes, was identified.

6. The 4th IAEA peer review mission & the Follow-up review

Japan received the 4th visit of the review mission team from the International Atomic Energy Agency (IAEA) during the period November 5-13 2018 (after three and half years since February 2015).

The main findings and conclusions in the summary report of the review mission reads: "The IAEA Review Team considers that significant progress has already been accomplished to move Fukushima Daiichi from an emergency situation to a stabilized situation. Many improvements have been recorded since the previous mission in 2015."

For the full version of the Report of IAEA International Peer Review Mission on Mid-and-Long-Term Roadmap towards the decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station:

https://www.iaea.org/newscenter/pressreleases/iaea-issues-final-report-on-fourth-review-of-fukushima-decommissioning

As described in 2.2 2. (4), the ALPS Subcommittee published the report on 10 February 2020 to show available options for disposal of the ALPS treated water. Taking into account the advisory point "The IAEA Review Team holds that a decision on the disposition path for the stored ALPS treated water containing tritium and other radionuclides, after further treatment as needed, must be taken urgently, engaging all stakeholders, to ensure the sustainability of the decommissioning activities and of the safe and effective implementation of other risk reduction measures." which was provided by IAEA in 4th Review mission, the Government of Japan provided IAEA the report as informing progress on the advisory point and requested IAEA to review the progress made in water management, including a review of the ALPS Subcommittee report.

The IAEA Review Report on management of ALPS treated water and the ALPS Subcommittee Report was published on April 2, 2020. In this report, the IAEA team noted that "the two options (namely controlled vapor release and controlled discharge into the sea, the latter of which is routinely used by operating nuclear power plants and fuel cycle facilities in Japan and worldwide) selected out of the initial five options are technically feasible and would allow the timeline objective to be achieved". The IAEA Review Team also notes that "the ALPS treated water will be further purified as necessary to meet the regulatory standards for discharge before dilution". Regarding the tritium separation technology, "the IAEA Review Team is not aware of a solution currently available for the separation of tritium commensurate with the concentration and the volume of ALPS treated water". The IAEA Review Team holds the view that "a decision on the disposition path for the stored ALPS treated water containing tritium and other radionuclides, after further treatment as needed, must be taken urgently, considering safety aspects and engaging all stakeholders".

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/4fu-report.pdf

2.3: Organizations related to decommissioning and contaminated water management

1. Fukushima Daiichi Decontamination & Decommissioning (D&D) Engineering Company

In April 2014, TEPCO established a company for the purpose of clarifying the responsibilities and authorities inside the company, and streamlining the process of decision making regarding decommissioning and contaminated water management at Fukushima Daiichi NPS.

In addition, the company invited nuclear specialists from outside TEPCO, such as high ranking nuclear executives of manufacturers, in order to collect and share expertise and technology of manufacturers.

This company is playing an important role on the frontline of decommissioning and contaminated water management.

TEPCO's website related to Fukushima Daiichi D&D Engineering Company:

http://www.tepco.co.jp/en/decommision/team/index-e.html

2. Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF)

In August 2014, the Nuclear Damage Compensation Facilitation Fund, originally established in 2011 to support the compensation for nuclear damage resulted from the Fukushima Daiichi NPS accident, was reorganized into Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF).

NDF's mission is to support decommissioning activities at Fukushima Daiichi NPS. As an example, it formulates decommissioning strategies and develops plans for the research and development (R&D) program on technology necessary for decommissioning.

NDF published the "Technical Strategic Plan 2019 for Decommissioning of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc." on September 9 ,2019; aiming to provide a firm technical basis for the government's "Mid- and-Long-Term Roadmap" and facilitate the smooth and steady implementation of decommissioning. This plan provides strategic proposals concerning the methods used to retrieve fuel debris from the first unit.

In August 2019, NDF held the 4th International Forum on the Decommissioning of the Fukushima Daiichi NPS to listen to locals and provide them with easily understandable information on the decommissioning of the Fukushima Daiichi NPS and widely share the latest progress on the decommissioning work and technical outcomes with Japanese and foreign experts. The forum was attended by 1,297 people from 10 countries. The 5th forum was scheduled for August 2020, but was postponed due to COVID-19.

NDF's booklet:

http://www.ndf.go.jp/soshiki/pamph_e.pdf

Technical Strategic Plan 2019 for Decommissioning of the Fukushima Daiichi Nuclear Power Station of Tokyo Electric Power Company Holdings, Inc.:

http://www.dd.ndf.go.jp/en/strategic-plan/index2019.html

The 4th International Forum on the Decommissioning of Fukushima Daiichi NPS:

https://ndf-forum.com/en/

3. International Research Institute for Nuclear Decommissioning (IRID)

In August 2013, IRID was established by 18 corporations and organizations related to R&D of technology for the decommissioning of Fukushima Daiichi NPS. In accordance with the Mid-and-long-term Roadmap written by the Government of Japan, IRID is conducting R&D on removal of fuel from the spent fuel pools, removal of fuel debris from the PCVs and disposal of radioactive wastes, and gathering domestic and international expertise. Currently, methods, which were developed by IRID, are being applied to investigations into Unit 1-3 reactor buildings, such as various kinds of robots and the muon cosmic ray.

IRID's website:

http://irid.or.jp/en/

4. Collaborative Laboratories for Advanced Decommissioning Science (CLADS)

In April 2015, Japan Atomic Energy Agency (JAEA) established the CLADS, based on the Acceleration Plan of Reactor Decommissioning R&D for Fukushima Daiichi NPS, TEPCO, proposed by Ministry of Education, Culture, Sports, Science and Technology (MEXT). This institution is aimed at being an international hub for R&D on decommissioning, and promoting cooperation in R&D and human resource development (HRD) among government, industry and academia.

CLADS main building was established in Tomioka-machi, Fukushima in April 2017, which is a central facility of CLADS where educational and research institutions at home and abroad work together to conduct R&D on decommissioning.

CLADS is expected to collaborate on research activities with the following JAEA's centers in Fukushima. Naraha Center for Remote Control Technology Development, which started operation in April 2016, and Okuma Analysis and Research Center, which consists of an Administrative Building, Radioactive Material Analysis and Research Facilities. The Administrative Building started operation in March 2018.

CLADS has held a series of Fukushima Research Conference (FRC) on Decommissioning Research and Development since 2015. In 2019, FRCs on themes such as "Materials Science for Severe Accident and Fukushima Daiichi Decommissioning Workshop 2019 (July)", "Workshop on Nuclear Hydrogen Safety (October)", "Remote Technologies for Nuclear Facilities (October)" and "Key Corrosion Issues to Maintain Structural Integrity for the Next Three Decades (December)" were held with the positive participation of young researchers and students including foreign students.

JAEA's website related to the CLADS:

https://clads.jaea.go.jp/en/

2.4: Communication

(1) Briefing session

The Government of Japan has held briefing sessions on Fukushima Daiichi NPS to the Diplomatic missions in Tokyo more than 100 times. Most recently, the 106th session was held by video conference on April 3, 2020.

Briefing material:

https://www.mofa.go.jp/files/000564692.pdf

Press Release by MOFA:

https://www.mofa.go.jp/press/release/press4e_002789.html

(2) Communication with parties concerned on disposition of ALPS treated water

As described in 2.2, the ALPS Subcommittee published its report on 10 February 2020 which shows the options for disposal of the ALPS treated water.

Based on the report, the Government of Japan has been holding meetings as an opportunity to receive opinions from a wide variety of parties concerned, including representatives of local municipalities and associations in the fields of agriculture, forestry and fisheries. GoJ held the 4th and 5th "Meetings as Opportunities for Receiving Opinions" on June 30 and July 17 respectively.

<Outline of the report>

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20200210_alps_sum.pdf

<Report>

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20200210_alps.pdf

(Reference: IAEA, Final report of the follow-up review mission)

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/4fu-report.pdf

(3) Side event at IAEA General Conference

In September 2019, METI and NDF held "the Side event on Fukushima Daiichi Decommissioning & Food Safety" at the 63rd IAEA General Conference. There was an active question and answer session with about 150 audiences.

Presentation materials:

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/gc_archive.html

Section 3: Monitoring results

3.1: Onsite monitoring results reported by TEPCO

(1) Outline of the item

On-going monitoring of the air at the site of Fukushima Daiichi NPS has detected no significant increase in radiation levels.

Results of radioactive nuclide analysis are published for the samples of groundwater at the site and seawater at the port in order to monitor the source.

(2) Noteworthy change in data during the period from June 2020 to August 2020

The monitoring result is ND (ND indicates that the measurement result is below the detection limit). In this regard, no announcement has been made by TEPCO for this item.

(3) Monitoring result data

The monitoring results in the air at the site and the monitoring results of the seawater near the NPS as well as sampling data from sub-drain and groundwater drain are available in the following webpage.

https://www4.tepco.co.jp/en/nu/fukushima-np/f1/smp/index-e.html

TEPCO also publishes the data on radioactive concentration in seawater measured by seawater radiation monitors as well as air dust monitors near the site boundary in real time.

https://www7.tepco.co.jp/responsibility/decommissioning/1f_newsroom/data/index-e.html

3.2: Offsite monitoring results

1. Monitoring results of air dose rates obtained within the 20 km zone around Fukushima Daiichi NPS

(1) Outline of the item

The monitoring of air dose rates within the 20 km zone around Fukushima Daiichi NPS has been conducted. The air dose rates within the 20 km zone have gradually declined over time since May 2011 (soon after the accident at Fukushima Daiichi NPS on March 11, 2011).

(2) Noteworthy updates in the past months

As described in (1) above, the air dose rates within the 20 km zone around the NPS have been on a downward trend, and the monitored air dose rates were stable in March 2020. Based on these results, no further announcement was made on this item (e.g., a significant rise of air dose rates within the 20 km zone) during this period.

(3) Monitoring results

The following URL leads to the monitoring results of air dose rates in Fukushima prefecture including the 20 km zone around Fukushima Daiichi NPS:

http://radioactivity.nsr.go.jp/map/ja/ (in Japanese)
https://radioactivity.nsr.go.jp/en/list/239/list-1.html

2. Monitoring results of dust in air and soil within the 20 km zone around Fukushima Daiichi NPS

(1) Dust

The monitoring results of dust obtained in July 2020 shown that the concentrations of dust were either ND (ND indicates that the measurement result is below the detection limit) or very low. Based on the results, no further announcement was made on this item (e.g., a significant rise of the activity concentrations obtained from dust samples) during this period.

(2) Soil

Radiation monitoring of soil is conducted as appropriate. The most recent monitoring of soil was conducted in September 2019.

(3) Monitoring results

The following URL provides the monitoring results (from April 2011 to the present):

http://radioactivity.nsr.go.jp/en/list/240/list-1.html

3. Converted values and measured values of environmental radiation dose rates at 1m height from the ground surface in 46 prefectures in total other than Fukushima Prefecture

(1) Outline

The air dose rates measured using the monitoring stations located in other prefectures have mostly returned to the same level of the air dose rates before the accident.

(2) Updates from June to August 2020

The converted and measured values were relatively stable from June to August 2020. Based on the results, no further announcement was made on this item (e.g., a significant rise of the converted and measured values) during this period.

(3) Monitoring results

The following URL leads to the estimated and measured values, and new monitoring results are uploaded:

http://radioactivity.nsr.go.jp/en/list/192/list-1.html

3.3: Sea area monitoring results of seawater, sediment and biota

1. Outline

Sea area monitoring results in the area around Fukushima Daiichi NPS have indicated that the radioactivity levels obtained from outside of the port or in the open sea have been relatively stable.

2. Updates during the period from June to August 2020

As described above, the sea area monitoring results were relatively stable from June to August 2020. Based on the results, any further announcement was not made on this item (e.g., a significant rise of sea area monitoring results) during this period.

3. Related information

Sea area monitoring is classified to be conducted in 5 areas (Area 1: Sea area close to Fukushima Daiichi NPS, Area 2: Coastal area, Area 3: Off-shore area, Area 4: Outer sea area, and Area 5: Tokyo bay area), and this information is available under the “Monitoring of sea water”, section of the NRA webpage entitled “Readings of Sea Area Monitoring”. This webpage also includes monitoring results of sediment under the “Monitoring of marine soil” section, and it is also classified into 4 areas (Area 1: Sea area close to Fukushima Daiichi NPS, Area 2: Coastal area, Area 3: Off-shore area, Area 4: Tokyo bay area). The NRA has been providing report on sea area monitoring results. The “Readings of Sea Area Monitoring” webpage covers various issues and the webpage’s information is periodically updated several times a week. The following URLs lead to the webpage and report on sea area monitoring:

Readings of Sea Area Monitoring
http://radioactivity.nsr.go.jp/en/list/205/list-1.html

Sea Area Monitoring (Monthly Report)
http://radioactivity.nsr.go.jp/en/list/295/list-1.html

Section 4: Off-site Decontamination

4.1: Outline

The whole area decontamination in the Special Decontamination Area (SDA) was completed in the end of March, 2017 as planned under the responsibility of the Government of Japan. The decontamination conducted by the municipalities in the Intensive Contamination Survey Area (ICSA) was also completed in March 19th, 2018. This means that the whole area decontamination based on the Act on Special Measures was completed, excluding "Difficult-to-Return Zones" (DRZ). The air dose rates in the environment have been continuously decreasing.

4.2: Interim Storage Facility (ISF)

As for the Interim Storage Facility (ISF), in which the soil generated from decontamination activities in Fukushima (hereinafter referred to as "removed soil") is stored intensively and safely, MOE has been processing land acquisitions to secure the necessary areas. The soil storage facility started operation in October 2017.

By the end of July 2020, approximately 8,009,256 m^3 of removed soil and waste has been transported to the ISF. Almost all of the removed soil will be delivered to the ISF by the end of March, 2022.

The following URL leads to MOE's website, in which updated information related to the Environmental Remediation is posted.

http://josen.env.go.jp/en/

Section 5: Food products

5.1: Summary of testing

Food samples are routinely monitored to ensure that they are safe for all members of the public.

During the month of June 2020, 3,550 samples were taken and analysed. Among these samples, 41 samples were found to be above the limits*. This represents 1.15 percent of all samples.

During the month of July 2020, 3,485 samples were taken and analysed. Among these samples, 1 samples were found to be above the limits. This represents 0.03 percent of all samples.

During the month of August 2020, 2,337 samples were taken and analysed. Among these samples, 1 samples were found to be above the limits. This represents 0.04 percent of all samples.

Restrictions will be imposed on the distribution of food products, if the level of radioactive contaminants of the food product exceeds the limit (caesium-134+caesium-137: 100 Becquerel/kg). Restrictions are to be removed, when the level of radioactive contaminants of the food product is constantly below the limit for a certain period of time. Therefore, the products, on which the distribution restrictions are newly imposed, are the products whose radioactive contaminant level exceeded the limit in the past month. By the same logic, the products whose restrictions are newly removed are the products whose radioactive contaminant level has been lower than the limit for a certain period of time.

*limits: caesium-134+caesium-137: 100 Becquerel/kg of general foods, 10 Becquerel/kg of drinking water, 50 Becquerel/kg of milk, 50 Becquerel/kg of infant foods.

5.2: Results of monitoring food products

1. The current situation and protective measures

A fact sheet uploaded in the link below is the summary of the current situation and the measures taken by the Government of Japan:

http://www.mhlw.go.jp/english/topics/2011eq/dl/food-130926_1.pdf

2. Noteworthy updates in the past months (during the period from June 2020 to August 2020)

The lists of food products, whose status on the restrictions was changed, are as follows.

(1) Products whose distribution was newly restricted in June 2020
- Koshiabura produced in Miyota-machi, Nagano prefecture.

(2) Products whose restrictions were removed in June 2020
- None

(3) Products whose distribution was newly restricted in July 2020
- None

(4) Products whose restrictions were removed in July 2020
- Log-grown shiitake (outdoor cultivation) produced in Ishinomaki-shi which are controlled under the management policy set by Miyagi prefecture.

(5) Products whose distribution was newly restricted in August 2020
- None

(6) Products whose restrictions were removed in August 2020
- None

3. Monitoring results data

See the link below (new monitoring results are added once a month):
http://www.mhlw.go.jp/english/topics/2011eq/index_food_radioactive.html

4. Information focused on the safety of the fishery product

The information which is provided in above (1)-(3) covers fishery products, but in addition to this information, further detailed information is available on the Fisheries Agency's website.
http://www.jfa.maff.go.jp/e/inspection/index.html

(1) Summary of monitoring on fishery products

The first half of the website consists of a summary of monitoring on fishery products. For further information and to see the actions taken to ensure the safety of fishery products, please see the fact sheet uploaded on the site.

(2) "Report on the Monitoring of Radionuclides in Fishery Products" was updated by the Fisheries Agency of Japan

Since the accident at the Fukushima Daiichi NPS, the Government of Japan and local authorities have cooperated closely with relevant bodies to secure the safety of fishery products. With an aim to promote accurate understanding on the safety of Japanese fisheries products at home and abroad, the data and information accumulated in the inspection of the

last three years was evaluated comprehensively in the previous Report, which was published in May 2014.

In October 2017, the Fisheries Agency of Japan released an updated report, which reflects the latest data and recent research results. It shows that, after six years since the accident, the level of radioactive Cs in fishery products has declined substantially.

The Report is available at the following URLs:
Japanese version, full Report
http://www.jfa.maff.go.jp/j/housyanou/attach/pdf/kekka-240.pdf

Japanese version, summary
http://www.jfa.maff.go.jp/j/housyanou/attach/pdf/kekka-216.pdf

English translation, full report
http://www.jfa.maff.go.jp/e/inspection/attach/pdf/index-34.pdf

English translation, summary
http://www.jfa.maff.go.jp/e/inspection/attach/pdf/index-35.pdf

(3) Monitoring results data

The second half of the website consists of various monitoring results on radioactivity measured in fishery products.

Section 6: Radiation Protection of Workers

Information pertaining to radiation protection of workers involving TEPCO's Fukushima Daiichi NPP Accident is updated on the following website of the Ministry of Health, Labour and Welfare (MHLW):

http://www.mhlw.go.jp/english/topics/2011eq/workers/index.html

6.1: Regulations and Guidelines, etc.

Regulations and Guidelines, etc. from the MHLW on radiation protection of workers are available on the following webpage:

https://www.mhlw.go.jp/english/topics/2011eq/workers/ri/index.html

6.2: TEPCO's Fukushima Daiichi NPS

The status on the exposure dose, health care management and radiation protection of the workers at TEPCO's Fukushima Daiichi NPS are as follows:

https://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/index.html

1. Status of Radiation Exposure

Exposure doses of the workers at TEPCO's Fukushima Daiichi NPS are reported to the MHLW once a month. The latest monthly report is available on the following webpage:

http://www.mhlw.go.jp/english/topics/2011eq/workers/irpw/index.html

2. Radiation Protection

Ensuring occupational safety and health of specified skilled foreign workers for the TEPCO Fukushima Daiichi Nuclear Power Plant (Updated on May 21, 2019)

https://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_190521.pdf

Results of supervision and instruction activities for employers of decommissioning workers at the TEPCO Fukushima Daiichi Nuclear Power Plant and employers of decontamination workers in Fukushima Prefecture (in 2018) (Updated on August 3, 2020)

https://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_200630.pdf

Measures for occupational safety and health management are enhanced at the TEPCO Fukushima Daiichi Nuclear Power Plant - A guideline was formulated - (Updated on August 26, 2015)

http://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/rp/pr_150826.html

3. Long-term Health Care

Updated Information on long-term health care of emergency workers including health examination and guidelines;

"Guidelines on Maintaining and Improving Health of Emergency Workers at Nuclear Facilities, etc." is available on the following webpage. (Updated on August 31, 2015)

http://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/rp/pr_150831_attachment06.pdf

4. Good Practices in Radiation Exposure Controls

Good Practices in Radiation Exposure Dose Reduction Measures (Commissioned by the Ministry of Health, Labour and Welfare in FY2018Project) (Updated on Aug, 2020)

https://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/gre/gre_2001.pdf

5. Other Related Topics

Updated other related information on the workers at TEPCO's Fukushima Daiichi NPS:

Healthcare of Workers at the Fukushima Daiichi Nuclear Power Plant (Updated on Aug 14, 2020)

https://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/ort/ort_200730.pdf

Start of a weekly on-site consultation desk to address health matters of decommissioning workers, etc. (Updated on June 24, 2016)

http://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/ort/ort_160624.html

6.3: Decontamination/Remediation

The status on radiation protection of the workers engaged in decontamination and remediation of contaminated materials derived from Fukushima Daiichi NPS Accident is as follows.

https://www.mhlw.go.jp/english/topics/2011eq/workers/dr/index.html

1. Decontamination/Remediation

   Updated Information on decontamination and remediation including guidelines and results of labour inspection:

   Results of supervision and instruction activities for employers of decommissioning workers at the TEPCO Fukushima Daiichi Nuclear Power Plant and employers of decontamination workers in Fukushima Prefecture (in 2018) (Updated on August 3, 2020)

   https://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_200630.pdf

2. Waste Disposal

   Information on waste disposal work including guidelines:

   http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/index.html#wd

3. Other Related Topics

   Other related information on waste disposal work:

   http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/index.html#ort

6.4: Other Information

Statistics on Radiation Exposure Doses of Decontamination Workers and Other Items Have Been Announced.

https://www.mhlw.go.jp/english/topics/2011eq/workers/ors/index.html

1. Related Information
   https://www.mhlw.go.jp/english/topics/2011eq/workers/ors/index.html#ri

2. Other Institutions
   https://www.mhlw.go.jp/english/topics/2011eq/workers/ors/index.html#io

3. Other Institutions
   Dose Statistical Data Based on the Information Registered with the System of Registration and Management of Radiation Exposure Doses for Decontamination and Related Work (2019) (by Radiation Effects Association) (Updated on Jul 21, 2020)

   http://www.rea.or.jp/chutou/koukai_jyosen/2019nen/English/honbun_jyosen-2019-English.html

Section 7: Other issues on recovery operations

7.1: Public communication

1. Provision of updates to the IAEA

The Government of Japan has actively been strengthening its communication process to ensure timely dissemination of accurate information on the current status of activities onsite in multiple languages for the international community. Japan provides updates in a timely manner and all of the updates provided to the IAEA are available on this webpage:

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

2. Lifting of evacuation orders

Current condition of evacuation order areas of Fukushima Daiichi NPS (as of October 2019)

In Tamura city, the order of *Preparation Areas for Lift of Evacuation Order* was removed on April 1st2014. In Naraha town, the order of *Preparation Areas for Lift of Evacuation Order* was removed on September 5th 2015. In Katsurao village, the order of *Habitation Restricted Areas* and *Preparation Areas for Lift of Evacuation Order* were removed on June 12th 2016. In Kawauchi village, the order of *Preparation Areas for Lift of Evacuation Order* was removed on June 14th2016. In Minamisoma city, the order of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed on July 12th2016. In Iitate village, Kawamata town and Namie town, the orders of *Habitation Restricted Areas* and *Preparation Areas for Lift of Evacuation Order* were removed on March 31st 2017. In Tomioka town, the orders of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed on April 1st 2017. In Okuma town, the order of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed on April 10th 2019. Except for the *Evacuation Orders* of Futaba town, all of the orders of *Habitation Restricted Areas* and the orders of *Preparation Areas for Lift of Evacuation Order* were lifted by spring 2019. *The evacuation orders* were lifted for parts of Futaba Town on March 4th, 2020, Okuma Town on March 5th, and Tomioka Town on March 10th. As a result, *the Evacuation Orders* were lifted for all areas except for the designated areas where returning is difficult by March 2020. The JR Joban line also resume full operation from March 14th, 2020.

As for cities, towns, and villages, where evacuation orders were removed, it was confirmed that annual cumulative dose, the total radiation dose which residents in the cities, towns, and villages would receive per year, was surely below 20mSv, and also the reconstruction of infrastructure necessary for people's daily life and decontamination were steadily advancing. In the wake of consultation with these cities, towns, and villages and adequate explanation to the residents through briefing sessions and by other means, the above-mentioned lift of the evacuation orders was determined.

<Reference> Classification of evacuation orders:

- Preparation Areas for Lift of Evacuation Order

  Entry into the area is permitted. Overnight stay in the area is generally prohibited. Business activities are permitted except those to be provided for residents living inside the area.

- Habitation Restricted Areas

  Entry into the area is permitted.
  Overnight stay in the area is prohibited in principle. Business activities are permitted but limited in some cases.

- Areas where Returning is Difficult

  Entry into the area is prohibited in principle, and staying in this area is also prohibited.

- Areas where returning is difficult effective from March 10, 2020
  https://www.meti.go.jp/english/earthquake/nuclear/roadmap/index.html

3. Relevant activities in disseminating information to the public

(1) Press Conference

Recovery operations at the Fukushima Daiichi NPS including contaminated water issues are one of the major issues which the Government of Japan has been focusing on. Since progress has been made frequently, there are updates arising on a daily basis. To explain the updates to the public, the Government of Japan disseminates the relevant information through press conferences. The Chief Cabinet Secretary and the Minister of Economy, Trade and Industry are the main briefers of the press conference, but other ministers or press secretaries may also be the briefer, depending on the subject.

(2) Information delivery to media

The government has been providing relevant information for both the domestic and the foreign press including those stationed in Tokyo and for other media, using various means such as press conferences, press briefings, press tours and press releases. As an example, the Fisheries Agency has conducted a media tour to a radioactivity monitoring site for fishery products (Marine Ecology Research Institute) in order to facilitate better understanding for monitoring on fishery products.

(3) Providing information to foreign nations

The Ministry of Foreign Affairs sends out a notification with relevant information to all foreign missions stationed in Tokyo and IAEA, in principle once a month. The same information is conveyed to all Japanese embassies, consulate generals, and missions. If necessary, the information would be shared with foreign nations and relevant organizations through these diplomatic channels.

In addition, The Government of Japan has held briefing sessions on Fukushima Daiichi NPS to the Diplomatic missions in Tokyo more than 100 times. Most recently, the 106th session was held on April 3, 2020.

Briefing material:

https://www.mofa.go.jp/mofaj/files/000564692.pdf

Press Release by MOFA:

https://www.mofa.go.jp/press/release/press4e_002789.html

Furthermore, the Ministry of Economy, Trade and Industry (METI) has produced a short video clip on the current situation in Fukushima Daiichi NPS and a brochure entitled “Important stories on Decommissioning Fukushima Daiichi Nuclear Power Station. Now and in the future”.

The video clip and the brochure are available at the following link:

https://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html

(4) Measures taken by TEPCO

TEPCO has been providing briefings on the status of Fukushima Daiichi NPS. In June and October 2014, in order to supplement such briefings, it arranged field observation tours of Fukushima Daiichi NPS for diplomatic officials and employees of embassies to Japan.

These briefings have been conducted with the aim of facilitating correct understanding through the expeditious communication of accurate information with the outside of Japan, as well as maintaining TEPCO’s accountability as the main party responsible for the accident.

The purpose of the field tours is to enable participants to observe the actual circumstances by viewing and touring the actual site, in conjunction with the briefings at diplomatic missions. Moreover, TEPCO expects to utilize the network of diplomatic officials to build a new relationship, and provide a connection with TEPCO, which had not been open before conducting these tours.

(5) Disseminating information to Japanese populations

In general, the information is shared with Japanese populations through the channels shown above in (1)-(2). In addition to these efforts, the Government of Japan has improved public communication by enriching the content of relevant ministries’ webpages and by hosting local briefing sessions on a case by case basis. METI regularly informs the progress of the decommissioning activities and contaminated water countermeasures to Fukushima prefecture and 13 local municipalities surrounding the site through video conference and direct visits.

4. Efforts on eliminating negative reputation impact and risk communication

(1) The Strategy for the Enhancement of the Elimination of Negative Reputation Impact and Risk Communication

In December 2017, the Government of Japan formulated the “The Strategy for the Enhancement of the Elimination of Negative Reputation Impact and for Risk Communication”, based on a thorough review of the past efforts by relevant ministries and agencies, in order to clear up negative reputation impact which lacks in scientific grounds, and unfounded prejudice and discrimination.

In addition to the risk communication with the affected people, this strategy, focusing on providing information to the general public in a simple manner, specifies objects and contents for information in order of importance, from three perspectives, that is, “To inform”, “To treat” and “To invite”, and examines concrete ways of delivering information. Under this strategy, relevant ministries and agencies cooperate in a unified manner both at home and abroad.

(a) To inform

To inform the general public, mostly schoolchildren, their parents, and expectant and nursing mothers, of basic points of radiation, health effects of radiation, the safety of foods and drinking water made in Fukushima, the status of the affected areas in which the recovery is in progress, etc.

(b) To treat

To inform retailers, distributors, consumers, embassies in Tokyo, and foreign VIPs, press, residents and tourists, of the appeal and tastiness of Fukushima products, system of ensuring the safety of foods and drinking water, the standards of radioactive substances, the control system of foods at production stage, etc.

(c) To invite

To inform teachers, those involved with a Parent-Teacher Association, travel agencies, foreign tourists, VIPs and press, and visitors from outside Fukushima, of the attraction of Fukushima as a destination, air dose rate and the safety of foods in Fukushima, and the supports for educational travels provided by Fukushima Prefecture.

(2) The Policy Package on Radioactive Risk Communication for Evacuees Returning to Their Homes

In February 2014, the Government of Japan compiled "The Policy Package on Radioactive Risk Communication for Evacuees Returning to Their Homes", in order to promote the implementation of detailed risk communication in response to the concerns of individuals. Relevant ministries and agencies also work together to promote measures including the organization of follow-up meetings on the policy package, focusing on the viewpoints of (a) dissemination of accurate and easy-to-understand information, (b) continuous development of risk communication on a national scale, and (c) improving detailed risk communication.

(3) Practical measures for evacuees to return their homes by NRA

NRA formulated practical measures of radiation protection for the evacuees, who will return to their homes, from scientific and technological points of view in cooperation with other governmental organizations. The practical measures continue to address the difficulties which the evacuees have been facing. It is expected that the practical measures will be helpful for the evacuees to make decisions on whether they will return to their homes or not.

The detail of these measures taken by NRA are available at the following link:

https://www.nsr.go.jp/data/000067234.pdf

7.2: Websites for your reference

Further information on each section above is available at the following websites:

The Prime Minister's Office
http://japan.kantei.go.jp/ongoingtopics/waterissues.html

The Food Safety Commission (FSC)
http://www.fsc.go.jp/english/emerg/radiological_index_e1.html

The Reconstruction Agency (RA)
http://www.reconstruction.go.jp/english/

The Ministry of Foreign Affairs (MOFA)
http://www.mofa.go.jp/j_info/visit/incidents/index.html

The Ministry of Health Labour and Welfare (MHLW)
http://www.mhlw.go.jp/english/topics/2011eq/index_food_policies.html

The Ministry of Agriculture, Forestry and Fisheries (MAFF)
http://www.maff.go.jp/e/quake/press_110312-1.html

The Fisheries Agency (FA)
http://www.jfa.maff.go.jp/e/index.html

The Ministry of Economy, Trade and Industry (METI)
http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html

https://www.meti.go.jp/english/earthquake/nuclear/roadmap/

The Ministry of the Environment (MOE)
http://josen.env.go.jp/en/

The Nuclear Regulation Authority (NRA)
http://www.nsr.go.jp/english/index.html

The Japan Atomic Energy Agency (JAEA)
http://www.jaea.go.jp/english/index.html

Tokyo Electric Power Company (TEPCO)
http://www.tepco.co.jp/en/nu/fukushima-np/index-e.html

Fukushima Daiichi Decontamination & Decommissioning Engineering Company
http://www.tepco.co.jp/en/press/corp-com/release/2014/1235009_5892.html

Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF)
http://www.ndf.go.jp/soshiki/pamph_e.pdf

International Research Institute for Nuclear Decommissioning (IRID)
http://irid.or.jp/en/

The Collaborative Laboratories for Advanced Decommissioning Science (CLADS)
https://clads.jaea.go.jp/en/

IAEA assessment on aspects presented in the October 2020 report *'Events and highlights on the progress related to recovery operations at Fukushima Daiichi Nuclear Power Station'*

Completion of treatment of temporarily stored "Sr-reduced water"

Japan reported that "Strontium (Sr)-reduced water", which had been temporarily stored in the storage tanks, had been treated by ALPS (Advanced Liquid Processing System). This treatment was completed by 8 August 2020. The tanks in which the "Sr-reduced water" was stored are to be reused for storing the ALPS treated water.

The IAEA acknowledges that the treatment by the ALPS system of stored "Sr-reduced water" has been successfully completed. This substantially reduces the risks associated with the continual storage of "Sr-reduced water" at TEPCO's Fukushima Daiichi Nuclear Power Station (NPS).

Revision of the Solid Waste Storage Management Plan

Japan reported that the fourth revision of the "Solid Waste Storage Management Plan" was issued on 30 July 2020. The Plan updated the estimated amount of solid waste to be generated in the next decade. It was confirmed that the updated estimate amount of solid waste will not modify the target year (i.e. by the end of FY2028) to eliminate the temporary outdoor storage area as set in the "Mid-and-Long-Term Roadmap".

The IAEA notes the revision of the "Solid Waste Storage Management Plan" with no adverse effect to deadlines set in the Mid-and-Long-Term Roadmap, and understands that the updated estimate of the amount of solid waste for the next decade is of the same order of magnitude as the estimate which was provided in the previous version of the Solid Waste Storage Management Plan issued in June 2019.

Thorough COVID-19 countermeasures implemented to continue work

Japan reported that necessary countermeasures have been implemented to prevent spreading the COVID-19 infection among workers at the Fukushima Daiichi NPS. These countermeasures have not led to significant impact or delay on on-site activities.

The IAEA notes the efforts made to prevent spreading COVID-19 infection, in order to allow for the continuity of decommissioning operations during this pandemic situation.

Fuel debris removal from Unit 2

Japan reported that the fuel debris removal from Unit 2 is scheduled in 2021 and that the retrieval equipment is being developed in the United Kingdom. In the trial retrieval plan, a robot arm will be used to access the Primary Containment Vessel (PCV) in Unit 2. Obstacles inside the PCV will be removed using the cutting equipment and powder fuel debris will be collected using a metal brush or vacuum system. Fuel debris retrieved will be placed in closed metal casks to be transported for analysis.

The IAEA acknowledges the ongoing progress towards fuel removal from Unit 2.

Fuel removal from the Spent Fuel Pool in Unit 3

Japan reported the progress on fuel removal from the Spent Fuel Pool (SFP) in Unit 3. As of 29 August 2020, 322 assemblies, including 52 non-irradiated fuel assemblies, out of a total of 566 fuel assemblies (514 spent fuel assemblies and 52 non-irradiated fuel assemblies) initially stored in the SFP of Unit 3, have been removed.

The IAEA acknowledges the ongoing progress toward completion of fuel removal from the SFP in Unit 3.

Sea area monitoring results

Japan reported that sea area monitoring results indicate no significant changes in radioactivity levels at locations outside of the port or in the open sea during the period June 2020 to August 2020. Monitoring results continue to be published regularly by the Nuclear Regulation Authority (NRA) of Japan and the Tokyo Electric Power Company (TEPCO). The data show that radioactivity levels in the marine environment (seawater, sediment and biota) in the areas around TEPCO's Fukushima Daiichi NPS have not been adversely affected by decommissioning and contaminated water management activities on-site.

Based on the information provided by Japan, no significant changes were observed in the monitoring results for seawater, sediment and marine biota during the period covered by this report. The levels measured by Japan in the marine environment are low and relatively stable. For the purpose of public reassurance, the IAEA encourages the continuation of sea area monitoring. Furthermore, the IAEA considers that the ongoing data quality assurance programme that is in place is important for facilitating transparency and promoting confidence in the accuracy and quality of the results of the monitoring programme to all stakeholders.

Food products

As reported by Japan, national regulatory limits for radionuclides of caesium remain in place and there is a comprehensive programme to monitor foods, including seafood. Areas where food is found to be above these national regulatory limits are subject to restrictions to prevent such food from entering the food supply chain.

Based on the information provided by Japan, the situation regarding the safety of the food supply, fishery and agricultural production continues to remain stable. Food restrictions continue to be revised and updated as necessary in line with food monitoring results. Many thousands of food samples were collected over the reporting period and this indicates continued vigilance of the authorities in Japan and their commitment to protecting consumers and trade. Monitoring, appropriate regulatory action and public communication are helping to maintain confidence in the safety of the food supply.

Based on the information that has been made available, the Joint FAO/IAEA Division understands that measures to monitor and respond to issues regarding radionuclide contamination of food are appropriate, and that the food supply chain is controlled effectively by the relevant authorities.