

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

October, 2017

## Section 1: Summary of updates from August 2017 through September 2017

### 1.1: Decommissioning and Contaminated Water management

Since the last report, there were progresses on the decommissioning and contaminated water management as below. For details please refer to section 2.

#### 1. Land-side impermeable wall (Frozen soil wall)

On the mountain side of the wall, following the Nuclear Regulation Authority (NRA)'s instruction, unfrozen sections were maintained from the viewpoint of safety. There had been seven unfrozen sections. Freezing started at all seven sections by August and 99% of the mountain side has been frozen.

#### 2. Reduction of inflow into buildings

Inflow into buildings has declined from around 400 m<sup>3</sup>/day to around 130 m<sup>3</sup>/day on the average after April 2017 by steadily implementing various measures for reduction based on the Mid- and Long- Term Roadmap. Moreover, the volume of groundwater pumped up keeps same level even during rain. The target set in the Roadmap has been almost reached.

#### 3. Efforts toward investigations inside the Unit 1, 2 and 3 Primary Containment Vessel (PCV)

Investigations inside the Unit 1, 2 and 3 PCV have been conducted to identify the status of debris inside to consider the best approach to retrieve the fuel debris.

For Unit 1, from 18 to 22 March, a dosimeter and underwater camera were suspended from the 1<sup>st</sup> 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 have severe distortion and damage. In addition, deposits of constant thickness were confirmed at the PCV bottom.

For Unit 2, from 26 January to 16 February, a camera and a robot were inserted close to the Reactor Pressure Vessel (RPV). The internal situation was grasped by the digital images. From the result of this investigation, fallen scaffold below the RPV and the status of deposits were identified directly for the first time.

For Unit 3, it was succeeded for the first time after the accident to acquire image inside of pedestal using the underwater remotely operated vehicle (ROV) from 19 to 22 July 2017. As the result damage inside pedestal and considered to be solidified molten materials were confirmed.

Big progresses have been made toward the decommissioning of Fukushima Daiichi NPS. During the investigations, there were no significant changes in radiation levels of monitoring posts and dust monitoring at the site boundaries of Fukushima Daiichi NPS. Through these investigations, there was and will be no effect by the radioactive material to the outside the PCVs.

#### 4. Revised mid- and long-term roadmap towards the decommissioning of TEPCO's Fukushima Daiichi NPS

Based on the results of the investigations above, at the end of August, a suggestion was made by the Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) for the Japanese government to decide a policy of fuel debris retrieval. The government revised the mid- and long-term roadmap incorporating the policy of fuel debris retrieval on 26 September.

## **1.2: Monitoring results**

There were no significant changes in the monitoring results of air dose rate, dust, soil, seawater, sediment and marine biota during the period from August 2017 to September 2017. For details please refer to section 3.

## **1.3: Off-site decontamination**

The Ministry of the Environment (MOE) completed the whole area decontamination in the Special Decontamination area (SDA) as planned, where Japanese government is responsible for decontamination, at the end of March 2017. For details please refer to section 4.

## **1.4: Food products**

Monitorings and inspections of radioactive materials in food are continuously conducted, and restrictions of food distribution and removal of these restrictions are taken based on monitoring results. Restrictions of several agricultural products were lifted during the period from August 2017 to September 2017.

According to the monitoring results of fishery products in Fukushima, from August 2017 to September 2017, the excess ratio\* was 0% (total: 1,360 samples). In the other prefectures, the excess ratio was 0 % (total: 1,138 samples). For details please refer to 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 works at Fukushima Daiichi Nuclear Power Station (NPS) or decontamination and related works; as well, the Ministry has taken relevant and necessary measures such as provision of long-term healthcare for emergency workers. For details please refer to section 6.

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

### **2.1: Basic strategies**

1. Basic Policy for the Contaminated Water Issue at the Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS (September 3, 2013)

(Summary)

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20130903\\_01a.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20130903_01a.pdf)

- Preventive and Multi-layered Measures for Decommissioning and Contaminated Water Management (December 20, 2013)

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20131226\\_001.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20131226_001.pdf)

- Mid-and-Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station (revised on September 26, 2017. Japanese only. Provisional translation will be available soon.)

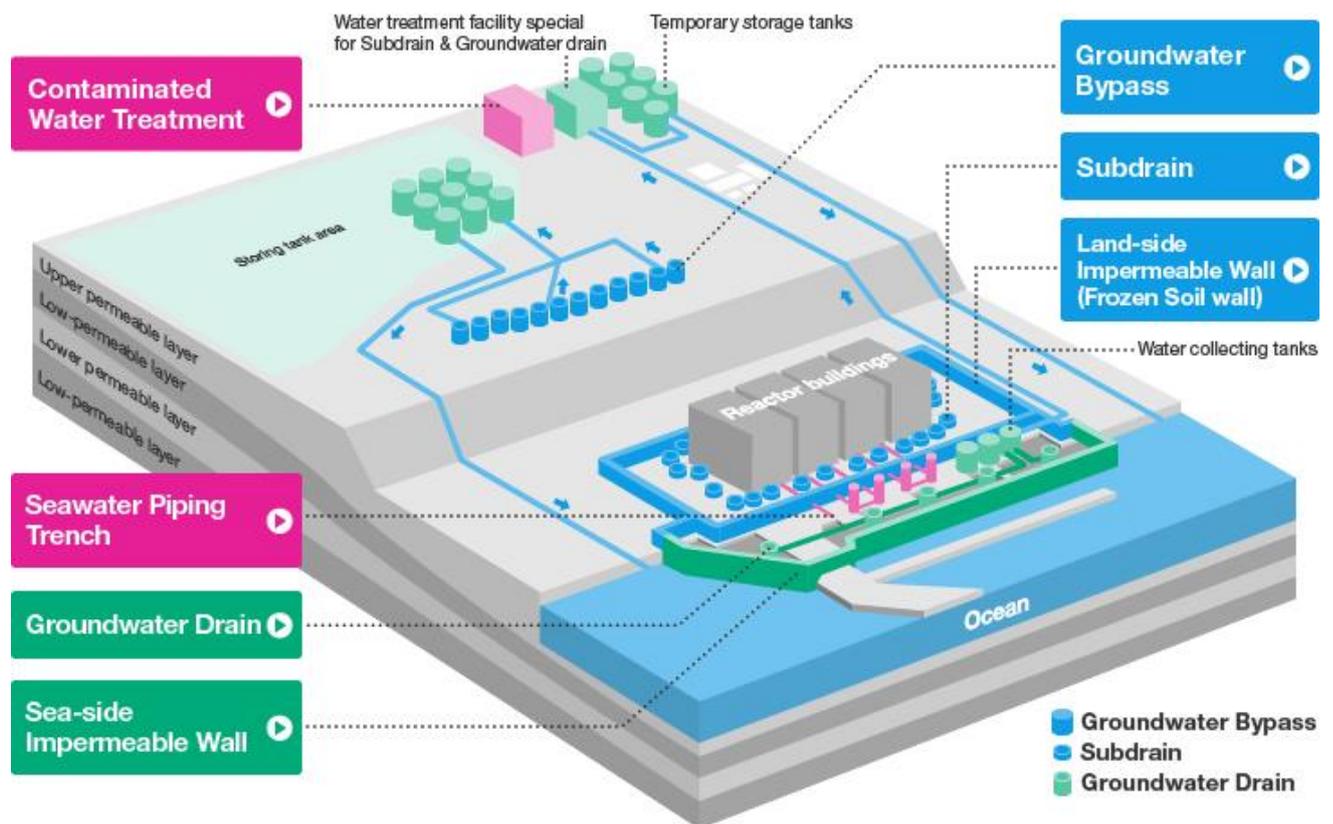
(Full text)

<http://www.meti.go.jp/earthquake/nuclear/pdf/20171003.pdf>

## 2.2: Measures for decommissioning and contaminated 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; “Remove sources of contamination”, “Isolate water from contamination” and “Prevent leakage of contaminated water”.



Source: TEPCO

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

Up until September 26, 2017, 313,755 m<sup>3</sup> of groundwater had been released to the ocean. The pumped-up groundwater was temporarily stored in tanks, 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 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 Nuclear Power Station (published by Ministry of Economy, Trade and Industry (METI))

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20171016\\_01a.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20171016_01a.pdf)

(October 16, 2017)

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170927\\_01a.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170927_01a.pdf)

(September 27, 2017)

(2) Subdrain and groundwater drain systems

(a) Objective

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

The groundwater drain system function 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 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. At the point when the former was lowered to T.P. 3.5 meters or when the latter

decreased to less than 2 meters, the amount of the water flowing into the reactor buildings was decreased to the level of approx. 150 - 200 m<sup>3</sup> per day.

\*T.P.: Tokyo Peil (Mean Sea Level of Tokyo Bay)

Up until September 26, 2017, 413,873 m<sup>3</sup> had been drained after TEPCO and a third-party organization had 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 the 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)

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20171016\\_01b.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20171016_01b.pdf)

(October 16, 2017)

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170927\\_01b.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170927_01b.pdf)

(September 27, 2017)

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

#### (a) Objective

The installation of the land-side impermeable wall aims to isolate clean groundwater from contamination. 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

On the sea side, freezing started in March 2016 and completed in October 2016.

Groundwater levels on the sea-side of the building and its volumes pumped at the area 4 m above sea level have been monitored to evaluate the effect of the impermeable walls. The pumped up groundwater has declined from approx. 400 m<sup>3</sup> at the time before freezing to approx. 170 m<sup>3</sup> in September 2017. That is to say the effect of the impermeable walls has been seen.

For the land-side impermeable walls (on the mountain side), as the implementation plan for complete closure was approved on August 15, freezing of the remaining unclosed section started from August 22.

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 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, was 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) Reduction of inflow into buildings

Inflow into buildings has declined from around 400 m<sup>3</sup>/day before measures were implemented to around 130 m<sup>3</sup>/day on average after April 2017 by steadily implementing various measures for reduction based on the Mid- and Long- Term Roadmap. The measures are preventive and multilevel such as groundwater bypass, subdrains, land-side impermeable walls and waterproof pavement. The target set in the Roadmap has been almost reached.

## 2. Purification treatment of contaminated 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.

### (3) Recent situations

In May 2015, TEPCO announced that it has completed the purification treatment of highly contaminated water in the storage tanks. As of September 2017, nearly 2,000 tons of contaminated water remains at the bottom of the tanks, which will be removed as the tanks are being dismantled. As a result, the radiological contamination risk due to leakage of contaminated water has been significantly reduced.

Regarding the contaminated water with low radioactive concentration, which includes tritium, experts are still investigating the most appropriate and safe approaches to dispose of it.

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

<http://www.tepco.co.jp/en/decommission/planaction/alps/index-e.html>

The subcommittee dealing with water treated with multi-nuclide removal equipment was established in September 2016. The subcommittee performs comprehensive study on how to deal with water treated with multi-nuclide removal equipment, including the societal point of view based on the knowledge from Tritiated Water Task Force Report published in June 2016 by the Tritiated Water Task Force. The 5th subcommittee was held in June 2017 to hear opinions of experts and local communities.

### 3. Fuel removal from the reactor buildings

#### (1) Basic information

At the time of the accident in March 2011, the nuclear power plant operator of Unit 1, 2 and 3 were unable to maintain cooling of the reactor cores due to power loss. This resulted generation of a huge amount of hydrogen gas from the melted fuel. The pressure in the containment buildings continued to increase from accumulation of hydrogen that eventually caused hydrogen explosions in Unit 1, 3 and 4, causing structural damage. However, since November 2011, the nuclear power plant 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 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 toward these goals, including removal of rubble accumulated in the buildings and investigation of the condition inside the PCV by using state-of-the-art technologies.

#### (2) Unit 1

In July 2015, TEPCO started dismantlement of the building cover of the reactor building as a step to start fuel removal from the spent fuel pool. In October of the same year, the removal of roof panels was completed without any significant change in radiation dose rate around the reactor building. The removal work of the roof panels proceeded carefully and anti-scattering measures were implemented to reduce spread of contamination. In September 2016, dismantling of wall panels (18 in total) started and completed in November of the same year. 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. For the further reduction of the dust scattering risk, modification of pillars and beams of the building cover for the installation of windbreak sheets are underway now.

Before retrieving fuel debris, investigation of the condition inside the PCV has commenced. From February to May 2015, TEPCO investigated 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 toward 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 surrounding environment and no significant change due to the investigation was identified in the monitoring data.



Dismantling of wall panels



Robot for investigation



Image inside PCV

### (3) Unit 2

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

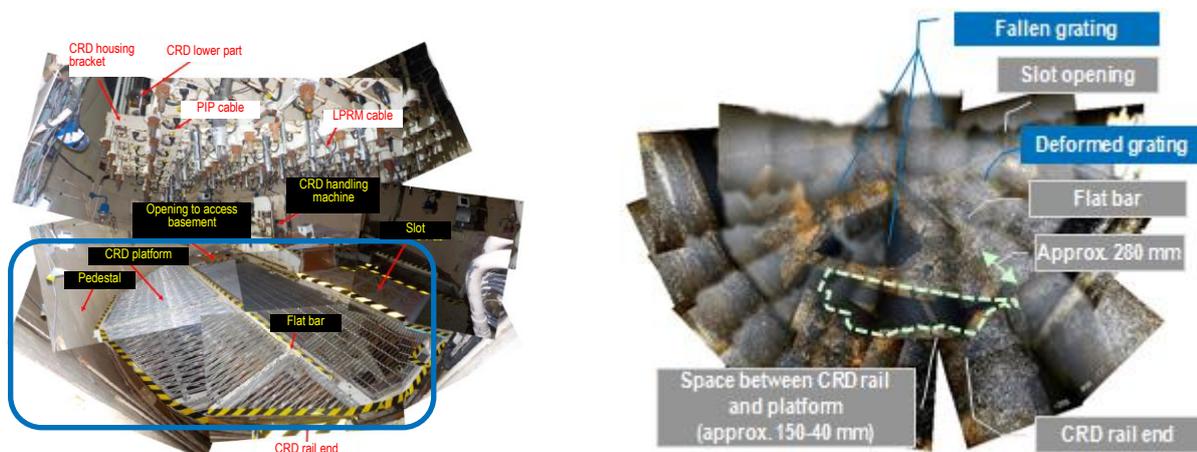
Another important preparation work is to find out the situation inside the building, around the PCV. Investigation of the inside of the building is being carried out by using robots to confirm conditions. The next step is to study the inside of the PCV. However, the robots with required technology for the investigation are still under development.

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 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 result of the investigation indicates that high-density material 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 grasped by the digital images. From the result of this investigation, fallen scaffold 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 were measured and these are big progresses toward the decommissioning of Fukushima Daiichi NPS.

There have been no changes in the temperature and pressure inside PCV and the reactor maintains a stabilized condition. The result of this investigation does not mean that some new phenomenon inside the PCV has occurred. Moreover, the inside of the PCV is shielded by thick steel vessel, concrete and zinc-plate inside the building. In addition, there are no significant changes in radiation levels of monitoring posts and dust monitoring at the site boundaries of Fukushima Daiichi NPS. Through this investigation, there was and will be no effect by the radioactive material to the outside the PCV.



(Reference) Inside the Unit 5 pedestal

Status inside the pedestal

#### (4) Unit 3

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

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



Installation of dome roof (Photo on August 5)

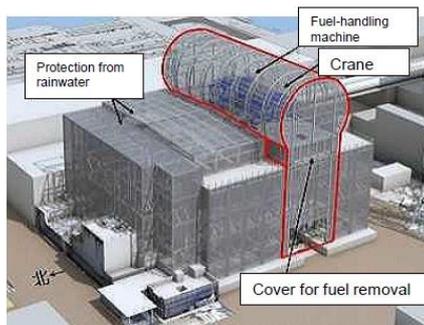


Image of the cover for fuel removal at Unit 3



Image inside PCV

For Unit 3, It was succeeded for the first time after the accident to acquire image inside of pedestal using underwater ROV from 19 to 22 July 2017. As a result, in the pedestal, considered to be solidified molten materials and damage situation of some structure such as housing support and grating were confirmed.

Investigation using muon cosmic ray to identify 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.



bottom of CRD housing



bottom of pedestal



bottom of pedestal

#### (5) Unit 4

In spite of a hydrogen explosion, the fuel assemblies of Unit 4 were not damaged, as the plant 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.



Equipment for fuel removal



Storage of removed fuel

#### (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 following step will be to carefully remove fuel from the spent fuel pools without impact on fuel removal from Units 1, 2 and 3.

Besides these efforts, various measures are ongoing at Fukushima Daiichi NPS. For more detailed information, please refer to the monthly “Progress Status Report” of METI below.

The Progress Status Report as of July 27, 2017

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170727\\_e.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170727_e.pdf)

The Progress Status Report as of August 31, 2017

[http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170831\\_e.pdf](http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/pdf/20170831_e.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 rank 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, 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).

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

The NDF and METI co-organized an international forum, in April 2016, on the decommissioning of Fukushima Daiichi NPS. The forum was attended by as many as 641 people from 15 countries including Japan. Main subjects were “Communications with Local Communities” and “World-leading Technical Session regarding Decommissioning.” “Decommissioning Technology Exhibition” was also held with participation of 37 institutions (16 from overseas).

On 2 and 3 July in 2017, the NDF held The 2nd International Forum on the Decommissioning of the Fukushima Daiichi NPS to listen to the local voice 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 as many as 1055 people from 11 countries.

NDF's booklet:

[http://www.ndf.go.jp/soshiki/pamph\\_e.pdf](http://www.ndf.go.jp/soshiki/pamph_e.pdf)

The 1st International Forum on the Decommissioning of Fukushima Daiichi NPS:

[http://ndf-forum.com/1st/about\\_en.html](http://ndf-forum.com/1st/about_en.html)

The 2<sup>nd</sup> International Forum on the Decommissioning of Fukushima Daiichi NPS:

[http://ndf-forum.com/home\\_en.html](http://ndf-forum.com/home_en.html)

### 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 Japanese government, 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 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 has been 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. One of the centers is Naraha Remote Technology Development Center, which started operation partially in October 2015 and fully started operation in April 2016. The other center is Okuma Analysis and Research Center, locates Radioactive Material Analysis and Research Facility is located, consists of Administrative Building, Laboratory-1 and Laboratory-2. This center will be launched from spring 2018.

CLADS has held a series of Fukushima Research Conference (FRC) on Decommissioning Research and Development since 2015. The third FRC subtitled as "Conference on Fuel Debris Characterization 2017" was held at Town Art & Media Center in Tomioka, Fukushima in September 5-6, 2017. Young researchers and students including foreign students also participated in these conferences positively.

JAEA's website related to the CLADS:

<http://fukushima.jaea.go.jp/english/index.html>

#### **2.4: Related information**

Measures for Mid-term Risk Reduction at TEPCO's Fukushima Daiichi NPS (Nuclear Regulation Authority (NRA)) (July 12, 2017)

<http://www.nsr.go.jp/data/000201934.pdf>

### **Section 3: Monitoring results**

#### **3.1: Onsite monitoring results reported by TEPCO**

##### **1. Radionuclide releases to the atmosphere**

###### **(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.

###### **(2) Noteworthy change in data during the period from August 2017 to September 2017**

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 of the NPS are available in the following webpage (Please see the calendar titled "Air on the premises of Power Station"). This monitoring result is updated every day on this site.

<http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/index-e.html>

##### **2. Radionuclide releases to the sea (including groundwater monitoring results)**

###### **(1) General outline of the item**

Results of radioactive nuclide analysis are published for the samples of groundwater at the east side of the Unit 1-4 turbine buildings and seawater at the port in order to monitor the source and the extent of the radioactive materials in the groundwater, and to determine whether the materials included in groundwater affect the sea.

Increase of the radioactivity level observed within the port, in an area smaller than 0.3 km<sup>2</sup>. However, ongoing monitoring in the surrounding ocean area has detected no significant increase in radiation levels outside the port or in the open sea, and has shown that radiation levels in these areas remain within the standards of the World Health Organizations guidelines for drinking water.

###### **(2) TEPCO's report on radionuclide releases to the sea**

TEPCO issued a report which includes progress and status of the ground improvement by sodium silicate. This report is available online:

[http://www.tepco.co.jp/en/nu/fukushima-np/handouts/2015/images/handouts\\_150109\\_02-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/handouts/2015/images/handouts_150109_02-e.pdf)

In addition, the historical data of radioactive concentration in the groundwater sampled at the Unit 1-4 bank protection are available online with the csv format. The data from north of Unit 1, between intakes of Units 1 and 2, between intakes of Units 2 and 3, and between intakes of Units 3 and 4 are available at the following sites respectively.

<http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2014/images/2tb-east-newest02-e.csv>

<http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2014/images/2tb-east-newest03-e.csv>

<http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2014/images/2tb-east-newest04-e.csv>

<http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2014/images/2tb-east-newest05-e.csv>

### (3) Related information

Analyses regarding radionuclide releases are conducted in different parts of the sea (outside of the port, inside of the port, and inside of the Unit 1-4 water intake channel). Results of these analyses and analysis results of groundwater are as follows (the information is automatically updated daily).

Analysis Results of Seawater (Outside of the Port)

[http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/seawater\\_map-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/seawater_map-e.pdf)

Analysis Results of Seawater (Inside of the Port)

[http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/intake\\_canal\\_map-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/intake_canal_map-e.pdf)

Analysis Results of Groundwater (Unit 1-4 Bank Protection)

[http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/tb-east\\_map-e.pdf](http://www.tepco.co.jp/en/nu/fukushima-np/f1/smp/2017/images/tb-east_map-e.pdf)

## 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 are gradually declined with the lapse of 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 decreasing trend, and the monitored air dose rates were stable from August 2016 to September 2016. Based on these results, any further announcement was not made on this item (e.g., a significant rise of air dose rates within the 20 km zone) during this period; therefore the frequency of the implementation of monitoring by survey meter was changed to annual.

#### (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)

[http://radioactivity.nsr.go.jp/en/contents/12000/11435/24/206\\_20160916.pdf](http://radioactivity.nsr.go.jp/en/contents/12000/11435/24/206_20160916.pdf)

## 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 from July 2017 to September 2017 show 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, any further announcement was not made on this item (e.g., a significant rise of the activity concentrations obtained from dust samples) during this period.

The following URL leads to the monitoring results (dated October, 2017) of dust:

[http://radioactivity.nsr.go.jp/en/contents/13000/12362/24/223\\_20171003.pdf](http://radioactivity.nsr.go.jp/en/contents/13000/12362/24/223_20171003.pdf)

### (2) Soil

Radiation monitoring of soil is conducted as appropriate. The most recent monitoring of soil was conducted in September 2017. The following URL leads to the monitoring results (dated September 25, 2017) of soil:

[http://radioactivity.nsr.go.jp/en/contents/13000/12341/24/495\\_20170925.pdf](http://radioactivity.nsr.go.jp/en/contents/13000/12341/24/495_20170925.pdf)

### (3) Previous monitoring results

The following URL provides the previous monitoring results (from April 2011 to the present) of dust in air:

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

## 3. Converted values and measured values of environmental radiation dose rate 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 equal level of the air dose rates before the accident.

### (2) Updates from August 2017 to September 2017

The converted and measured values were relatively stable from August 2017 to September 2017. Based on the results, any further announcement was not 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 nearly every day:

<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 indicates that the radioactivity levels obtained from the outside of the port or in the open sea have been relatively stable.

## 2. Updates during the period from August 2017 to September 2017

As described in (1) above, the sea area monitoring were relatively stable from August 2017 to September 2017. 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 TEPCO's 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 TEPCO's 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 URL 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>

Seawater Radioactivity Near Fukushima Daiichi NPS – weekly update –

<https://www.nsr.go.jp/english/f1issues/index.html>

## Section 4: Off-site Decontamination

### 4.1: Outline

The whole area decontamination in the Special Decontamination Area (SDA), where Japanese government is responsible for decontamination, was completed as planned at the end of March, 2017. The decontamination conducted by the municipalities in the Intensive Contamination Survey Area (ICSA) has also come close to the end. The air dose rates in the environment have been decreasing.

#### 1. Special Decontamination Area (SDA)

Japanese government is responsible for development of plans and implementation of measures for decontamination of the SDA. The SDA consists of the previous "restricted areas" located within a 20 km radius from the NPS and the previous "deliberate evacuation areas" which are beyond 20km radius from the NPS and where the additional annual effective dose for individuals was anticipated to exceed 20 mSv in the first year after the accident. The decontamination work in the SDA was completed as planned at the end of March 2017.

## 2. Intensive Contamination Survey Area (ICSA)

ICSA is the area where the air dose rate is over 0.23  $\mu$  Sv/h (equivalent to over 1 mSv/y of additional dose under a certain condition). Decontamination work for the area is implemented by each municipality with financial and technical supports by the Japanese government. As of the end of this July, 84 municipalities have completed the decontamination work and the rest of 8 municipalities have almost completed based on their respective Decontamination Implementation Plans.

### 4.2: Interim Storage Facility (ISF)

As for the Interim Storage Facility (ISF), in which contaminated soil generated in Fukushima will be stored intensively and safely, MOE has been processing land acquisitions to secure the necessary areas.

Approximately 230,000  $m^3$  of contaminated soil and waste has been delivered to the ISF by FY2016. In FY2017, MOE plans to transport approximately 500,000  $m^3$ , taking measures learned in the previous transportations.

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 August 2017, 27,028 samples were taken and analysed. Among these samples, 9 samples were found to be above the limits (caesium-134+caesium-137: 100 Becquerel/kg). This represents 0.03 percent of all samples.

During the month of September 2017, 22,871 samples were taken and analysed. Among these samples, 9 samples were found to be above the limits (caesium-134+caesium-137: 100 Becquerel/kg). This represents 0.04 percent of all samples.

Restrictions are 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 monitored to be 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.

### 5.2: Results of monitoring food products

#### 1. The current situation and protective measures

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

2. Noteworthy updates in the past months (during the period from August 2017 to September 2017 )

The lists of food products whose status regarding the restriction was changed are as follows.

(1) Products whose distribution was newly restricted in August 2017

- none

(2) Products whose restrictions were removed in August 2017

-none

(3) Products whose distribution was newly restricted in September 2017

-none

(4) Products whose restrictions were removed in September 2017

- Bamboo shoots produced in Itako-shi, Ibaraki prefecture

- Pteridium aquilinum produced in Iwaki-shi, Fukushima prefecture

- Wild ostrich ferns produced in Aizumisato-machi, Fukushima prefecture

3. Monitoring results data

See the link below (new monitoring results are added once a week):

[http://www.mhlw.go.jp/english/topics/2011eq/index\\_food\\_radioactive.html](http://www.mhlw.go.jp/english/topics/2011eq/index_food_radioactive.html)

4. Information focused on the safety of the fishery products

The information that is provided above in (1)-(3) cover fishery products, but in addition to this information, further detailed information is available on the Fisheries Agency's website

<http://www.ifa.maff.go.jp/e/inspection/index.html>

(1) Summary of monitoring on fishery products

The first half of the website consists of summary of monitoring on fishery products. For further information and to see the actions taken to ensure the safety of fishery products, please refer to the fact sheet uploaded in the site. This fact sheet is available in English, French, Spanish, Russian, Chinese and Korean.

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

Since the accident at the TEPCO's 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 April 2015, the Fisheries Agency of Japan released updated Report, which reflects latest data and recent research results. It shows that, after four years from 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.ifa.maff.go.jp/j/housyanou/pdf/report\\_zenbun.pdf](http://www.ifa.maff.go.jp/j/housyanou/pdf/report_zenbun.pdf)

Japanese version, summary

[http://www.ifa.maff.go.jp/j/housyanou/pdf/report\\_gaiyou\\_a.pdf](http://www.ifa.maff.go.jp/j/housyanou/pdf/report_gaiyou_a.pdf)

English translation, full report

[http://www.ifa.maff.go.jp/e/inspection/pdf/report\\_on\\_the\\_monitoring\\_of\\_radionuclides\\_in\\_fishery\\_products.pdf](http://www.ifa.maff.go.jp/e/inspection/pdf/report_on_the_monitoring_of_radionuclides_in_fishery_products.pdf)

English translation, summary

[http://www.ifa.maff.go.jp/e/inspection/pdf/summary\\_report\\_1\\_1.pdf](http://www.ifa.maff.go.jp/e/inspection/pdf/summary_report_1_1.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: TEPCO's Fukushima Daiichi NPP

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

#### 1. Status of Radiation Exposure

Exposure doses of the workers at TEPCO's Fukushima Daiichi NPP 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

Information on radiation protection of workers including measures to be taken and evaluation of committed effective dose of workers at the affected plant:

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

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 2016) (Updated on March 6, 2017)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/rp/rp\\_170306.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepco/rp/rp_170306.pdf)

#### 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/tepc/rp/pr\\_150831\\_attachment06.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/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 FY2016Project) (Updated on Feb, 2017)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre\\_1702.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre_1702.pdf)

Nov. 14, '16Good Practices in Radiation Exposure Control at the Fukushima Daiichi NPP (Fiscal Year of 2016) (Updated on November 14, 2016)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre\\_161114.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre_161114.html)

Good Practices in Radiation Exposure Control at the Fukushima Daiichi NPP (Fiscal Year of 2015)(Updated on November 10, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre\\_151111.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/gre/gre_151111.html)

#### 5. Other Related Topics

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

Healthcare of Workers at the Fukushima Daiichi Nuclear Power Plant

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/ort/ort\\_170727.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/ort/ort_170727.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/tepc/ort/ort\\_160624.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepc/ort/ort_160624.html)

Senior Vice-Minister of Health, Labour and Welfare Demands Thorough Implementation of Occupational Accident Prevention Measures (Updated on January 23, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr\\_150123.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr_150123.html)

## 6.2: Decontamination/Remediation

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

### 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 2016) (Updated on Mar 6, 2017)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp\\_170306.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp_170306.pdf)

Results of supervision and instruction activities for employers of decommissioning workers at the TEPCO Fukushima Daiichi Nuclear Power Plant and decontamination workers in Fukushima Prefecture (from Jan. to June 2016) (Updated on September 20, 2016)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp\\_160920.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp_160920.pdf)

Results of supervision and instruction activities for employers of decommissioning and decontamination workers at the TEPCO Fukushima Daiichi Nuclear Power Plant (in 2015) (Updated on April 13, 2016)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp\\_160413.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcor/rp/rp_160413.pdf)

Promotion of General Measures toward Improvement of Level of Compliance with Laws and Ordinances for Decontamination Works, etc (Fukushima Prefectural Labour Bureau Notification No. 1030-2) (Updated on October 30, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr\\_151030.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr_151030.pdf)

Results of supervision and instruction activities for employers of decontamination workers (from Jan. to June 2015) (Updated on October 9, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr\\_151009.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr_151009.pdf)

Results of supervision/instructions to employers of decontamination workers (July - December 2014) (Updated on March 5, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr\\_150305.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/dr/dr_150305.html)

## 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>

## 6.3: Related Information

### 1. Press Releases

Press releases from the MHLW on radiation protection of workers are updated on the following webpage.

Measures to prevent radiation hazards for emergency workers at nuclear facilities were formulated - Ordinance on Prevention of Ionizing Radiation Hazards and related regulations were partially revised to be applied from 1 April 2016 - (Updated on August 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorp/pr\\_150831.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorp/pr_150831.html)

Measures for occupational safety and health management will be 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/tepcorp/pr\\_150826.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorp/pr_150826.html)

Producing and Offering Graphic Presentations of Dose Statistical Data Based on the Information Registered with the System of Registration and Management of Radiation Exposure Doses for Decontamination and Related Works (2014) (by Radiation Effects Association) (Updated on July 14, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/ort/pr\\_150714.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/dr/ort/pr_150714.html)

Quarterly Radiation Exposure Dose Distribution of Workers for Decontamination and Related Works, etc. (Preliminary Figures) [From April 2014 to March 2015] (by Radiation Effects Association) (Updated on July 14, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ors/oi/pr\\_150714\\_a01.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ors/oi/pr_150714_a01.pdf)

A recommendation received from the Labor Policy Council confirming the validity of the "Outline of the Draft Ministerial Ordinance for Partial Revision of the Ordinance on Prevention of Ionizing Radiation Hazards" (Updated on June 18, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorppr\\_150618.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorppr_150618.html)

Senior Vice-Minister of Health, Labour and Welfare Demands Thorough Implementation of Occupational Accident Prevention Measures (Updated on January 23, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr\\_150123.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr_150123.html)

## 2. Guidelines/Notifications

Guidelines and notifications from the MHLW on radiation protection of workers are available on the following webpage.

<http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/index.html#gn>

Guideline on Revision of Part of the Guidelines on Safety and Health Education for Those Who Are Currently Engaged in Dangerous or Harmful Operations (Labour Standards Bureau Notification No. 0831-6) (Updated on August 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831\\_attachment09.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831_attachment09.pdf)

Formulation of the Guideline: “Guidelines on Maintaining and Improving Health of Emergency Workers at Nuclear Facilities, etc.” (Labour Standards Bureau Notification No. 0831-10) (Updated on August 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831\\_attachment10.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831_attachment10.pdf)

Formulation of the “Guidelines on occupational safety and health management at the TEPCO Fukushima Daiichi Nuclear Power Plant” (Updated on August 26, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150826\\_attachment03.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150826_attachment03.pdf)

Regulations/Legislations

Regulations and legislations of the MHLW on radiation protection of workers are available on the following webpage.

<http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/index.html#r>

Opinions on the Draft Ministerial Ordinance to Revise Part of the Ordinance on Prevention of Ionizing Radiation Hazards (Updated on August 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/rl/pr\\_150831.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/rl/pr_150831.pdf)

Enforcement of the Ministerial Ordinance for Partial Revision of the Ordinance on Prevention of Ionizing Radiation Hazards and Other Related Regulations (Labour Standards Bureau Notification No. 0831-13) (Updated on August 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831\\_attachment11.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/tepcorpr/150831_attachment11.pdf)

### 3. Governmental reports

Governmental reports issued by the MHLW are available on the following webpage.

Responses and Actions Taken by the Ministry of Health, Labour and Welfare of Japan on Radiation Protection at Works Relating to the Accident at TEPCO's Fukushima Daiichi Nuclear Power Plant 4th Edition (Fiscal Year of 2016) (Updated on January 31, 2017)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr\\_170131.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_170131.pdf)

Result of review at the "review meeting on occupational/non-occupational ionizing radiation disease" and approval as occupational disease/injury (Updated on August 19, 2016)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr\\_160819.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_160819.pdf)

Responses and Actions Taken by the Ministry of Health, Labour and Welfare of Japan on Radiation Protection at Works Relating to the Accident at TEPCO's Fukushima Daiichi Nuclear Power Plant 3rd Edition (Fiscal Year of 2015) (Updated on January 31, 2016)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr\\_160131.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/gr_160131.pdf)

Result of review at the "review meeting on occupational /non-occupational ionizing radiation disease" and approval as occupational disease/injury (Updated on October 20, 2015)

<http://www.mhlw.go.jp/english/policy/employ-labour/labour-standards/dl/151111-01.pdf>

A Report Has Been Compiled on Methods etc. for Providing Health care and Exposure Dose Control during Emergency Works in Nuclear Facilities. (Updated on May 1, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr\\_150520.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/pr/pr_150520.html)

Response and Action Taken by the Ministry of Health, Labour and Welfare of Japan on Radiation Protection at Works Relating to TEPCO's Fukushima Daiichi Nuclear Power Plant Accident. (Updated on March 31, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/pr\\_150331\\_a01.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/gr/pr_150331_a01.pdf)

#### 4. Leaflets/Brochures

Leaflets and brochures published by the MHLW on radiation protection of workers are available on the following webpage.

<http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/index.html#lb>

More thorough implementation of ensuring working conditions and controlling radiation exposure, etc. of workers engaged in decontamination and related works. (Updated on April, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/lb/lb\\_1504.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/lb/lb_1504.pdf)

Engaging in decontamination and related works by young people below the age of 18 (minors) is prohibited. (Updated on February, 2015)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/lb/lb\\_1502.pdf](http://www.mhlw.go.jp/english/topics/2011eq/workers/ri/lb/lb_1502.pdf)

#### 5. Other Institutions

Statistics on Radiation Exposure Doses of Decontamination Workers and Other Items Have Been Announced. (Updated on April 15, 2015)

<http://www.mhlw.go.jp/english/topics/2011eq/workers/ors/index.html#oi>

The launch of the organization for systematic control of radiation exposure doses, etc. for decontamination and related works (Updated on November 15, 2013)

[http://www.mhlw.go.jp/english/topics/2011eq/workers/ors/oi/pr\\_131115.html](http://www.mhlw.go.jp/english/topics/2011eq/workers/ors/oi/pr_131115.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 provided updates in August on 2, September on 5 and 16, 2016. 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 Dai-ichi Nuclear Power Plant (as of September 2017)

In Tamura city, the order of *Preparation Areas for Lift of Evacuation Order* was removed on April 1<sup>st</sup> 2014. In Naraha town, the order of *Preparation Areas for Lift of Evacuation Order* was removed on September 5<sup>th</sup> 2015. In Katsurao village, the order of *Habitation Restricted Areas* and *Preparation Areas for Lift of Evacuation Order* were removed on June 12<sup>th</sup> 2016. In Kawauchi village, the order of *Preparation Areas for Lift of Evacuation Order* was removed on June 14<sup>th</sup> 2016. In Minamisoma city, the order of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed on July 12<sup>th</sup> 2016. In Iitate village, Kawamata town and Namie town, the order of *Habitation Restricted Areas* and *Preparation Areas for Lift of Evacuation Order* were removed on March 31<sup>st</sup> 2017. In Tomioka town, the order of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed on April 1 2017. Except for the evacuation orders in Okuma town and Futaba town, all of the order of *Habitation Restricted Areas* and the order of *Preparation Areas for Lift of Evacuation Order* were removed by spring 2017.

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 order were 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.

### 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 briever, 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 that stationed in Tokyo and for other media, using various means such as press conferences, press briefings, press tours and press releases. For 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 through diplomatic channels

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

In addition, the Ministry of Foreign Affairs holds briefing sessions on Fukushima Daiichi NPS issues for the foreign missions stationed in Tokyo, when there is a significant update. The information on the last briefing session is shown in the link below.

[http://www.mofa.go.jp/dns/inec/page22e\\_000751.html](http://www.mofa.go.jp/dns/inec/page22e_000751.html)

Furthermore, the Ministry of Economy, Trade and Industry (METI) has produced a short video clip on the current situation in Fukushima, in collaboration with the Support Team for Residents Affected by Nuclear Incidents under the Nuclear Emergency Response Headquarters under the Cabinet Office. This video was shared through many Japanese embassies and ministerial-level bilateral conversations, etc.

The video is available in the following link:

<http://www.meti.go.jp/english/earthquake/nuclear/decommissioning/index.html#video>

#### (4) Measures taken by TEPCO

TEPCO has thus far been providing briefings on the status of Fukushima Daiichi NPS. In June and October 2014, in order to supplement such briefings, it has arranged for 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 a correct understanding through the expeditious communication of accurate information 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 as they are at the power station 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' webpage and by hosting a local briefing session 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. Risk Communication

#### (1) Policy Package on Radioactive Risk Communication for Evacuees Returning to Their Homes

In February 2014, the Government of Japan compiled a "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.

#### (a) Dissemination of accurate and easy-to-understand information

The Government of Japan collects and provides information on the latest scientific knowledge about radiation and the progress of decontamination in an easy-to-understand

manner, and supports the activities of municipalities in the creation and distribution of documents on risk communication.

(b) Continuous development of risk communication on a national scale

The Government of Japan will promote continuous initiatives in the following policies targeting the entire country, and further improve the contents and methods of implementation based on the needs of local governments and residents.

- (i) Telephone consultations from the public
- (ii) Organization of lectures and trainings
- (iii) Organization of public meetings for consumers on radioactive substances in food
- (iv) Educational initiatives

(c) Improving detailed risk communication

The Government of Japan is improving detailed risk communication by continuing to implement the following initiatives so that local residents can live their lives with peace of mind.

- (i) Improve risk communications with small groups of people
- (ii) Improve training of experts that have close ties to the community
- (iii) Enhance risk communications with counselors that can provide close support for residents

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

NRA formulated practical measures of radiation protection for the evacuees, who will return 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 whether they return their homes or not.

The detail of these measures taken by NRA is available in 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](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](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/2011eg/index\\_food\\_policies.html](http://www.mhlw.go.jp/english/topics/2011eg/index_food_policies.html)

The Ministry of Agriculture, Forestry and Fisheries (MAFF)

[http://www.maff.go.jp/e/quake/press\\_110312-1.html](http://www.maff.go.jp/e/quake/press_110312-1.html)

The Fisheries Agency (FA)

<http://www.ifa.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>

The Ministry of the Environment (MOE)

<http://iosen.env.go.jp/en/>

The Nuclear Regulation Authority (NRA)

<http://www.nsr.go.jp/english/>

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](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](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)

<http://fukushima.jaea.go.jp/english/topics/pdf/topics-fukushima066e.pdf>

**IAEA assessment on aspects presented in the October 2017 report ‘Events and highlights on the progress related to recovery operations at Fukushima Daiichi Nuclear Power Station’**

#### **Revision of the Mid-and-Long-Term Roadmap**

Japan reported that it had revised the Mid- and-Long-Term Roadmap by incorporating the policy of fuel debris retrieval on 26 September 2017. This was the result of a suggestion by the Nuclear Damage Compensation and Decommissioning Facilitation Corporation (NDF) that the Japanese government should decide on a policy of fuel debris retrieval.

#### **Reduction of groundwater inflow into the buildings and the release of pumped-up groundwater to the sea**

Japan reported that water inflow into buildings has declined from around 400 m<sup>3</sup>/day in 2011 to around 130 m<sup>3</sup>/day (on average) after April 2017, based on the steady implementation of various reduction measures in accordance with the Mid- and Long- Term Roadmap. Japan also reported that the implementation plan for complete closure of the land-side impermeable walls was approved by the Nuclear Regulation Authority (NRA) on 15 August 2017 and that freezing of the remaining unclosed section began on 22 August 2017.

*The IAEA acknowledges the multiple initiatives taken by Japan, including groundwater bypass, sub-drains, land-side impermeable walls and water proof pavement which have contributed to the steady reduction in the volume of groundwater inflow into the buildings. The IAEA also notes that freezing of the remaining unclosed section of the land-side impermeable walls has begun.*

### **Off-site decontamination**

Japan reported that in the Intensive Contamination Survey Area, where the air dose rates were measured to exceed 0.23 µSv/h<sup>1</sup>, 84 municipalities had completed the decontamination work by July 2017, and the remaining 8 municipalities are progressing in accordance with their respective plans.

*The IAEA acknowledges the efforts undertaken by the Government of Japan as well as the concerned prefectures and municipalities to implement off-site decontamination. The IAEA notes Japan's plans to continue monitoring the air dose rate in the environment and to continue implementing remediation measures, as appropriate.*

### **Sea area monitoring results**

Japan continued reporting sea area monitoring results and that there have been no significant changes since the last report. These monitoring results continue to be published regularly by NRA. The data shows 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. In particular, the discharges of treated and monitored groundwater continue to have no detectable effect on the levels of radioactivity in the marine environment, which were measured in these areas during the period covered by this report.

*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, particularly considering the ongoing authorized discharges of treated and monitored groundwater into the ocean.*

### **Sea area monitoring data quality assurance**

The IAEA continues to assist the Government of Japan in ensuring that the regularly updated Sea Area Monitoring programme is comprehensive, credible and transparent. The organisation of IAEA proficiency tests and inter-laboratory comparison exercises, which have been organized biannually for seawater and annually for sediment and fisheries samples since 2014 to test the sampling and analytical performance of the Japanese laboratories for the analysis of radionuclides in seawater, sediment and fisheries samples, will continue. The seventh inter-laboratory comparison exercise and the fourth proficiency test are currently underway. Experts from the IAEA visited Japan from 16 to 26 October 2017 to collect

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<sup>1</sup> Equivalent to over 1 mSv/y of additional dose under a certain condition.

seawater, marine sediment and fish samples from coastal waters in the Fukushima Prefecture, [as part of this seventh inter-laboratory comparison exercise](#).

*The IAEA considers that the extensive data quality assurance programme helps to build confidence of the stakeholders in the accuracy and quality of the sea area monitoring data<sup>2</sup>.*

### **Food products**

As reported by the authorities of Japan, the national regulatory limits for radionuclides of caesium remain in place; food production areas, where food is found to be above these limits, are subject to restrictions in order to prevent such food from entering into the food supply chain; the situation regarding food products remains stable, and; a comprehensive surveillance system is in place for the monitoring of food, including seafood.

*Based on the information provided by the authorities of Japan, the situation with regard to the safety of food, fishery and agricultural production continues to remain stable. No significant changes were observed since the previous report. Monitoring foods, appropriate regulatory action and public communication are helping to maintain confidence in the safety of the food supply. Food restrictions continue to be revised and updated as necessary in line with the food monitoring results. This indicates the continued vigilance of the authorities in Japan and their commitment to protecting consumers and trade.*

*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.*

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<sup>2</sup> A report on the on the first three years of the inter-laboratory comparison exercise activities was published in July 2017: <https://www.iaea.org/sites/default/files/project-report270717.pdf>