Fukushima Daiichi Nuclear Power Station

Units 1 to 3: Shutdown due to the earthquake
(Units 4 to 6: Outage due to regular inspections)

- The national government has instructed the public to evacuate for those local residents within 20km radius of the site periphery and to evacuate voluntarily for those local residents between 20km and 30km radius of the site periphery.
- Off-site power has been connected to Units 1 to 6 by March 22nd, 2011.
- At approximately 6:38am, April 12th, fire has been found at the distribution switchboard containing batteries located in the sampling equipment switchbox situated close to the south water discharge channel for Units 1-4. The self defense fire fighting team conducted the fire fighting at an early stage. At the same time, at approximately 6:45am, we reported to the Futaba fire authorities. There is no impact on the external release of radioactive substances or on the cooling capability of the reactor from this incident. There has been no change on the monitoring figures of the surrounding environment. The Futaba fire authorities confirmed fire extinguishment on site survey at 9:12am, April 12th.

【Unit 1】

- The explosive sound and white smoke was confirmed near Unit 1 when the big quake occurred at 3:36pm, March 12th.

<Water injection to the reactor>

- At 8:20pm, March 12th sea water injection was started. Later boric acid which absorbs neutron was added.
- At approx. 2:30am, March 23rd: sea water injection through feed water system was started. At 3:37pm March 25th, it was switched to the fresh water. At 8:32am, Mar 29th, the fire pump used to inject fresh water was replaced by a temporary motor driven pump. From 10:42 am to 11:52am on April 3rd, the fire pump was temporarily used for the water injection in order to switch the power of the motor driven pump from temporary power to the off-site power. It was again switched to the motor driven pump, and the fresh water injection is continued.
- Water injection to the reactor was temporarily suspended due to a partial shutdown of the off-site power caused by the earthquake which occurred at approximately 5:16pm, April 11th. Following the restoration of off-site power, water injection resumed at approximately 6:04pm.
- At 5:00 pm, on April 15th, we had completed transferring emergency power sources to spray water to the reactor to the upland.
- On April 18th, in order to replace hoses, which were used to inject water to the reactors, injecting water was temporarily suspended. After replacement, we restarted injecting water by pumps

<Water spray to the spent fuel pool>

- The sea water spray was conducted using the concrete pumping vehicle from 1:03pm to 4:04pm, March 31st.
- In order to confirm the position of water spray to the spent fuel pool by the concrete pumping vehicle, the sea water spray was conducted from 5:16pm to 5:19pm, April 2nd.

<Draining water from underground floor of Turbine building>

- At approximately 5:00pm, March 24th, draining water from the basement of the turbine building into a condenser was started. It was paused at approx. 7:30am, March 29th because it reached almost full capacity. In order to move the water in the condenser to a condensate storage tank, water in the condensate storage tank was transferred to suppression pool's water surge-tank from around 0:00pm, March 31st to 3:26pm, April 2nd.
- The water transfer from the condenser to the condensate storage tank was started at 1:55pm, April 3rd. It was completed at 9:30m, April 10th.

<Injection of nitrogen to the reactor containment vessel>

- As it is suspected that hydrogen gas may be accumulated inside the reactor containment vessel, at 10:30pm, April 6th, we started the operation of the valve for the injection of nitrogen to the vessel in order to prevent the increase of oxygen density. Following this, nitrogen injection to the vessel was started at

1:31am, April 7th.

- Injection of nitrogen to the vessel was suspended due to the earthquake which occurred at approximately 5:16pm, April 11th, and resumed at 11:34pm on the same day.

<Others>

- Lights in the main control room were turned on at approx. 11:30am, March 24th.
- Some of turbine building lights were turned on April 2nd.

【Unit 2】

- At approx. 6:14am, March 15th, the abnormal sound was confirmed near the suppression chamber and the pressure inside the chamber decreased afterwards. It was determined that there was a possibility that something happened in the suppression chamber. While sea water injection to the reactor continued, TEPCO employees and contract workers not in charge of water injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.

<Water injection to the reactor>

- At 1:25pm, March 14th, since the Reactor Core Isolation Cooling System has failed, it was determined that a specific incident stipulated in Clause 1, Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (failure of reactor cooling function).
- At 5:17pm, March 14th, while the water level in the reactor reached the top of the fuel rod, we have resumed the water injection with the valve operation.
- At 10:10am on March 26th, fresh water (with boric acid) injection was initiated. (switched from the seawater injection) At 6:31pm, March 27th, the fire pump used for the injection was switched to a temporary motor driven pump.
- From 10:22am to 12:06pm on April 3rd, the fire pump was temporarily used for the water injection in order to switch the power of the motor driven pump from temporary power to the off-site power. It was again switched to the motor driven pump, and the fresh water injection is continued.
- Water injection to the reactor was temporarily suspended due to a partial shutdown of the off-site power caused by the earthquake which occurred at approximately 5:16pm, April 11th. Following the restoration of off-site power, water injection resumed at approximately 6:04pm.
- At 5:00 pm, on April 15th, we had completed transferring emergency power sources to spray water to the reactor to the upland.
- On April 18th, in order to replace hoses, which were used to inject water to the reactors, injecting water was temporarily suspended. After replacement, we restarted injecting water by pumps

<Water spray to the spent fuel pool>

[Seawater spray]

- From approx. 3:05pm to approx. 5:20pm on March 20th: about 40 tons of sea water injection through Fuel Pool Cooling and Filtering System (by TEPCO).
- From approx. 4:00pm to approx. 5:00pm on March 22nd: about 18 tons of sea water injection through Fuel Pool Cooling and Filtering System (by TEPCO).
- From 10:30am to 12:19pm on March 25th: sea water injection through Fuel Pool Cooling and Filtering System (by TEPCO).

[Freshwater spray]

- From 4:30pm to 6:25pm on March 29th: fresh water injection through Fuel Pool Cooling and Filtering System (Switched to fresh water injection).
- At 9:25am, March 30th, we started fresh water injection by a temporary motor driven pump, but we switched the pump to the fire pump due to the pump trouble. At 1:10pm, March 30th, fresh water injection was suspended, because we found the crack on a part of the hose. At 7:05pm, March 30th, freshwater injection was resumed and finished at 11:50pm, March 30th.
- From 2:56pm to 5:05pm on April 1st: water injection using the temporary motor

driven pump.

- From 11:05am to 1:37 pm on April 4th: water injection using the temporary motor driven pump.
- From 1:29pm to 2:34pm on April 7th: water injection using the temporary motor driven pump.
- From 10:37am to 12:38pm on April 10th: water injection using the temporary motor driven pump.
- From 1:15pm to 2:55pm on April 13th: water injection using the temporary motor driven pump
- From 10:13am to 11:54am on April 16th: water injection using the temporary motor driven pump
- From 4:08pm to 5:28pm on April 19th: water injection using the temporary motor driven pump

< Draining water from underground floor of Turbine building >

- In order to drain the accumulated water in the basement of the turbine building to a condenser, at approx. 4:45pm, March 29th, the water in a condensate storage tank was started to be transferred to suppression pool's water surge-tanks as a preparatory work for the water transfer from a condenser to a condensate storage tank. At 11:50am, April 1st, transfer was completed.
- The water transfer from the condenser to the condensate storage tank was started at 5:10pm, April 2nd. It was finished at 1:10pm, April 9th.

<Power >

- On March 18th, power was delivered up to substation for backup power through offsite transmission line. Cables were laid on further to unit receiving facility in the building. At 3:46pm, March 20th the load-side power panel of the receiving facility was energized.

<Others>

- Lights in the main control room were turned on at approx. 4:46pm, March 26th.
- Some of turbine building lights were turned on April 2nd.
- On April 16th, in order to check the condition of the water in the spent fuel pool for the purpose of designing temporary cooling equipment that we are planning to install in the pool, we collected and conducted a nuclide analysis of approximately 400 ml of water that flowed out of the pool into the skimmer surge tanks*, and as a result iodine-131, cesium-134, and cesium-137 were detected. We are going to evaluate the result in further detail.

  * skimmer surge tanks: 2 tanks installed between the spent fuel pool and the nuclear reactor well to store the water that overflows from the pool and the well.

【Unit 3】

~~At 6:50 am, March 14, the pressure in the primary containment vessel increased to 530 kPa. As a result. Thus, at 7:44 am, it was determined that a specific incident stipulated in the Article 15, the Clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred (abnormal increase of the pressure of reactor containment vessel). Afterwards, the pressure gradually decreased (as of 9:05 am, March 14, 490 kPa).~~

* We announced in our past reports that "On March 14, the pressure in the primary containment vessel increased and it was determined that a specific incident stipulated in the Article 15, the Clause 1 of Act on Special Measures Concerning Nuclear Emergency Preparedness occurred". However, we made a mistake in the calculation of the pressure value and the status of Unit 3 did not fall under the above-mentioned specific incidents. We will delete the related description from our latest report.

- At approximately 11:01am, March 14th, an explosion followed by white smoke occurred near Unit 3. 4 TEPCO employees and 3 contract workers from other companies (all of them were conscious) sustained injuries and were taken to the hospital by ambulances.
- Since 6:15am, March 17th, the pressure of the Suppression Chamber temporarily increased, on March 20th, we were preparing to implement measures to reduce

the pressure of the reactor containment vessel (partial discharge of air containing radioactive material to outside) in order to fully secure safety. However, at present, it was not a situation to immediately implement measures and discharge air containing radioactive material to outside. We will continue to monitor the status of the pressure of the reactor containment vessel.

- At approx. 3:55pm, March 21st, light gray smoke was confirmed arising from the southeast side of the roof of the reactor building. The situation was reported to the fire department at approx. 4:21pm. The parameters of reactor pressure vessel, reactor containment vessel, and monitored figures at the surrounding areas remained stable without significant change. However, workers around Unit 3 evacuated to a safe location. On March22nd, the color of smoke changed to somewhat white and it was slowly disappearing.
- At approx. 4:20pm on March 23rd, light black smoke was observed belching from the reactor building. The situation was reported to the fire department at approx. 4:25pm. The parameters of the reactor, the reactor containment vessel, and monitored figures at the surrounding area remained stable without significant change. To be safe, workers around Unit 3 evacuated to a safe location. At approx. 11:30pm on March 23rd and 4:50am on March 24th, TEPCO employees confirmed the smoke has disappeared. Accordingly, workers evacuation was lifted.

<Water injection to the reactor>

- High Pressure Coolant Injection System automatically stopped. We endeavored to restart the Reactor Core Isolation Cooling System but failed. Also, we could not confirm the water inflow of Emergency Core Cooling System. As such, we decided at 5.10am, Mar 13th, and we reported and/or noticed the government agencies concerned to apply the clause 1 of the Article 15 of Act on Special Measures Concerning Nuclear Emergency Preparedness at 5:58am, Mar 13th. At 9:25am, Mar 13th, the injection of water with boric acid and which absorbs neutron using the fire pump to the reactor was started.
- At 6:02pm on March 25th, the injection of fresh water to the reactor was started (switched from the seawater injection). At 8:30pm on March 28th, the fire pump used to inject water was replaced by temporary motor driven pumps. From 10:03 am to 0:16pm on April 3rd, the fire pump was temporarily used for the water injection in order to switch the power of the motor driven pump from temporary power to the off-site power. It was again switched to the motor driven pump, and the fresh water injection is continued.
- Water injection to the reactor was temporarily suspended due to a partial shutdown of the off-site power caused by the earthquake which occurred at approximately 5:16pm, April 11th. Following the restoration of off-site power, water injection resumed at approximately 6:04pm.
- At 5:00 pm, on April 15th, we had completed transferring emergency power sources to spray water to the reactor to the upland.
- On April 18th, in order to replace hoses, which were used to inject water to the reactors, injecting water was temporarily suspended. After replacement, we restarted injecting water by pumps

<Water spray to the spent fuel pool>

[Freshwater spray]

- From 7:05pm to 8:07pm, March 17th the police and Self-Defense Forces sprayed fresh water by water cannon trucks upon our request for the cooperation.
- From around 2:00pm to 2:45 pm, March 18th Self-Defense Forces and the United States Armed Forces sprayed fresh water by water cannon trucks upon our request for the cooperation.

[Seawater spray]

- Upon our request for the cooperation, spraying water to the upper part of the reactor building by helicopters with the support of the Self Defense Forces was considered On March16th. However the operation was cancelled.
- From approx. 9:30am to past 10:00am, March 17th, water was sprayed by helicopters upon our request for the cooperation to Self-Defense Forces.

- From approx. 12:30am to approx. 1:10am, March 19th, water was sprayed with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department. They resumed the operation from approx. 2:10pm to 3:40am, March 20th.
- From approx. 9:30pm, March 20th to 3:58am, March 21st, water was sprayed with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department.
- From approx. 3:10pm to 3:59pm, March 22nd, water was sprayed with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department.
- Sea water was injected through Fuel Pool Cooling and Filtering System;
  - From approx. 11:00am to 1:20pm on March 23rd
  - From approx. 5:35am to 4:05pm on March 24th
- From 1:28pm to 4:00pm, March 25th, water was sprayed with the cooperation of Fire Rescue Task Forces of Tokyo Fire Department.
- From approx. 12:34pm to 2:36pm, March 27th, water was sprayed by the concrete pumping vehicle.

[Fresh water spray]

- From approx. 2:17pm to 6:18pm, March 29th, fresh water was sprayed by the concrete pumping vehicle (switched to fresh water spray).
- Fresh water was sprayed by the concrete pumping vehicle;
  - From 4:30pm to 7:33pm, March 31st / From 9:52am to 12:54pm, April 2nd
  - From 5:03pm to 7:19pm, April 4th / From 6:53am to 8:53am, April 7th
  - From 5:06pm to 8:00pm, April 8th / From 5:15pm to 7:15pm, April 10th
  - From 4:26pm to 5:16pm, April 12th / From 3:56pm to 4:32pm, April 14th
  - From 2:17pm to 3:02pm, April 18th

< Draining water from underground floor of Turbine building >

- In order to drain the accumulated water in the basement of the turbine building to a condenser, at approx. 5:40pm, March 28th, the water in a condensate storage tank was started to be transferred to suppression pool's water surge-tanks as a preparatory work for the water transfer from a condenser to a condensate storage tank. At approx. 8:40am, March 31st, transfer was completed.

<Others>

- Lights in the main control room were turned on at approx. 10:45pm on March 22nd.
- Some of turbine building lights were turned on April 2nd.

【Unit 4】

- At approx. 6:00am, March 15th, an explosive sound was heard and the damage in the 5th floor roof of Unit 4 reactor building was confirmed. At 9:38am, the fire near the northwest part of 4th floor of Unit 4 reactor building was confirmed. At approx. 11:00am, TEPCO employees confirmed that the fire was extinguished.
- At approx. 5:45am on March 16th, a TEPCO employee discovered a fire at the northwest corner of the reactor building. TEPCO immediately reported this incident to the fire department and the local government and proceeded with the extinction of fire. At approx. 6:15am, TEPCO employee confirmed at the site that there were no signs of fire.

<Water spray to the spent fuel pool>

[Freshwater spray]

- From 8:21am to 9:43am, March 20th, water was sprayed by fire engines with the cooperation of Self-Defense Forces. From 6:30pm to 7:46pm on the same day, water was sprayed by Self-Defense Forces' fire engines.
- From 6:37am to 8:41am, March 21st, water was sprayed by fire engines with the cooperation of Self-Defense Forces and the United States Armed Forces.

[Seawater spray]

- Seawater was sprayed by the concrete pumping vehicle;
  - From 5:17pm to 8:32pm, March 22nd.
  - From 10:00am to approx. 1:02pm March 23rd
  - From approx. 2:35pm to approx. 5:30pm March 24th

- From 6:05am to 10:20am, March 25th, sea water was injected through Fuel Pool Cooling and Filtering System.
- Seawater was sprayed by the concrete pumping vehicle;
  - From 7:06pm to 10:07pm, March 25th / From 4:55pm to 7:25pm March 27th
  - From 2:04pm to 6:33pm March 30th / From 8:28am to 2:14pm April 1st
  - From 5:14pm to 10:16pm, April 3rd / From 5:35pm to 6:22pm, April 5th
  - From 6:23pm to 7:40pm, April 7th / From 5:07pm to 7:24pm, April 9th
  - From 12:30am to 6:57am, April 13th/ From 2:30pm to 6:29pm, April 15th
  - From 5:39pm to 9:22pm, April 17th
  - From 10:17am to 11:35am, April 19th
  - From 5:08pm to 8:31pm, April 20th
  - From 5:14pm to 9:20pm, April 21st

[Analysis of the water in the spent fuel pool]

- On April 12th, in order to confirm the status of the inside of the spent fuel pool, we collected approximately 200ml of water from the pool using the concrete pumping vehicle. On April 13th, we conducted nuclide analysis on them and detected Cesium-134, Cesium-137, and Iodine-131. We are planning to conduct more detailed analysis hereafter.
- From April 22nd, we will install the thermocouple-type thermometer and the radiation dose meter to the concrete pumping vehicle at the spent fuel pool of Unit 4 and we will investigate the water level of pool, water temperature, radiation dose, water analysis etc

<Others>

- On March 21st, cabling has been completed from temporary substation to the reactor building.
- Lights in the main control room were turned on at 11:50am on March 29th.
- Some of turbine building lights were turned on March 31st.
- In order to confirm the status of fuel stored in the spent fuel pool of Unit 4, we sampled water from the spent fuel pool on April 12th. We are planning to conduct the nuclide analysis. We conducted nuclide analysis of water obtained from the pool on April 13th, and detected iodine-131, caesium-134, and cesium-137. We are planning to conduct more detailed analysis hereafter.

【Units 5 and 6】

- At 5:00am on March 19th, we started cooling the spent fuel pool of Unit 5 by activating the Residual Heat Removal System Pump (C). At 10:14pm, we started cooling the spent fuel pool of Unit 6 by activating the Residual Heat Removal System Pump (B).
- Unit 5 has been in reactor cold shutdown since 2:30pm on March 20th. Unit 6 has been in reactor cold shutdown since 7:27pm on March 20th.
- In order to prevent hydrogen gas from accumulating within the buildings, we have made three holes on the roof of the reactor building for each of Units 5 and 6.
- At approx. 5:24pm on March 23rd, the temporary Residual Heat Removal System Seawater Pump automatically stopped when its power source was switched. We restarted the pump at 4:14pm, March 24th, and resumed cooling of reactor at 4:35pm.
- From 11am to 3pm on April 19th, draining water from the basement of the turbine building of Unit 6 was transferred into the condenser.

【Others】

<Securing offsite power reliability>

- At 10:23 am on April 19th, connection work between high voltage switchgear of Unit 1&2 and Unit 3&4 was completed.

<Detection of radioactive materials>

[Soil]

- Plutonium has been detected from the sample of soil at the site of Fukushima Daiichi Nuclear Power Station collected on March 21st, 22nd, 25th, 28th, 31st and April 4th. We strengthened environmental monitoring of power station and surrounding environment just in case. Additionally Iodine, Cesium, Tellurium,

Barium, Niobium, Ruthenium, Molybdenum, Technetium, Lanthanum, Beryllium, Silver have been detected from the sample of soil collected at Fukushima Daiichi Nuclear Power Station on March 21st, 22nd, 25th, 28th, 31st and April 4th.

- We collected the soil at the site of Fukushima Daiichi Nuclear Power Station on March 28th and as a result of uranium assay, detected Uranium-234, 235 and 238 which are the same level as that occurs naturally.

[Air]

- The values of radioactive materials (iodine, etc) measured contained in the air at the site exceeded normal figures. It was determined that a specific incident stipulated in article 15, clause 1 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (Extraordinary increase of radiation dose at site boundary) has occurred;
  - 4:17pm March 12th (near MP 4)
  - 8:56am March 13th (near MP 4)
  - 2:15pm March 13th (near MP 4)
  - 3:50am March 14th (near MP 6)
  - 4:15am March 14th (near MP 2)
  - 9:27am March 14th (near MP 3)
  - 9:37pm March 14th (near the main gate of the station)
  - 6:51am March 15th (near the main gate of the station)
  - 8:11am March 15th (near the main gate of the station)
  - 4:17pm March 15th (near the main gate of the station)
  - 11:05pm March 15th (near the main gate of the station)
  - 8:58am March 19th (near MP 5)

- We detected radioactive materials in the air collected at the site of Fukushima Daiichi Nuclear Power Station on March 20th and 21st from March 23rd to April 19th. The data of three detected nuclides (Iodine-131, Cesium-134 and Cesium-137) were reported as fixed data. Other nuclides figures are to be re-evaluated by the improved methods for recurrence prevention which have been prepared in accordance to the strong warning by NISA on April 1st.
- Since permanent monitoring posts (MPs1 to 8) were restored, we keep monitoring and publicly announce the data from them.

[Water]

- On March 21st and from March 23rd to April 19th we detected radioactive materials from the seawater around the discharge canal of the station. The data of three detected nuclides (Iodine-131, Cesium-134 and Cesium-137) were reported as fixed data. Other nuclides figures are to be re-evaluated by the improved methods for recurrence prevention which have been prepared in accordance to the strong warning by NISA on April 1st.
- We detected radioactive materials contained in the accumulated water in the turbine buildings of Units 1 to 4. As a preparation for treating the water, we conducted water analysis and detected radioactive materials. The analysis of water was carried out in Fukushima Daini Nuclear Power Station with support from other nuclear companies (Japan Atomic Energy Agency, Japan Nuclear Fuel Limited).
- At approx. 3:30pm, March 27th, we found water pooling in the vertical shaft of the trench outside of the turbine buildings for Units 1 to 3. The radiation dose at the surface of the water amounted 0.4 mSv/h (Unit 1) and over 1,000 mSv/h (Unit 2). We could not confirm the amount of the radiation dose as for Unit 3. We keep observing the condition of the water in the vertical shaft. No significant changes in water level of the vertical shaft of the trench for Units 1 to 3 were confirmed after the earthquake which occurred at approximately 5:16pm, April 11th.
- We detected niobium, technetium, ruthenium, silver, tellurium, iodine, cesium, and ruthenium in the water collected at the trench of unit 1 on March 29th. We took samples from the water in the trench of Units 2, 3, 5 and 6 on March 30th, and conducted nuclide analysis on them. We are now confirming the results of the analysis.
- At approx. 9:30am, April 2nd, we found that there was accumulated water in the shaft (concrete product) for storing power cables near the intake of water for Unit

2, that the airborne radiation was over 1,000mSv/h and that the water spilled into the sea from the crack (approx. 20 cm) on the side of the shaft. Since there is a joint between the trench of Unit 2 and the shaft, based on the possibility that the accumulated water in the turbine building of Unit 2 was spilled into the sea through this joint, we injected fresh concrete to the shaft twice, however, we could not observe a change in the amount of water flowing into the sea. Therefore, we considered that a new method to stop the water and determined to use the polymer. On April 4th, we injected the tracer from the vertical shaft to examine the flow path. We did not observe reduction of flow or change of color of water leaked. We checked the drawings and confirmed the route. At the same time, we checked the situation of the pit in detail and considered the possibility that the water was not from the pit, rather, from the joint between the piping upstream of the pit and the duct, then the water seeped through a layer of gravel below the piping. In order to stop that seepage from the layer of gravel, we decided to conduct the water sealing to the bedrock around the piping. We arranged for the specialist and gathered equipments. On April 5th, liquid glass was injected to the bedrock. Tracer was put through the two new holes drilled near the pit to investigate the water flow. At 2:15pm, April 5th, it was observed the water with tracer came out from the crack on the concrete wall of the pit. At 3:07pm, April 5th, injection of coagulant from the holes was initiated and we have confirmed the outflow from the crack on the concrete wall of the pit has stopped at 5:38am, April 6th. We confirmed the water level has not been rising in the turbine building of unit 2. On April 6th, a countermeasure by using rubber plate and fixer was implemented to prevent discharge of radioactive materials, and we are continuously monitoring for any existence of leakage. We had used grout to stop the outflow, and finished the work on April 21st. We are also planning to conduct countermeasures to prevent the outflow of accumulated water from the pit.

The amount of high density contaminated water spilled from the screen at the side of turbine building, Unit 2 is estimated to be about 520 m^3 with $4.7*10^{15}$ becquerel, provided that the water flowed continuously at the same pace from April 1st to April 6th.

From 3:00pm April 5th, a construction of installing large sandbags around the pier to prevent the outflow of the contaminated water from station's port on the south side to the ocean was started. From April 15th to April 17th, we threw in ten sandbags including zeolite in front of the screen rooms of Units 1 to 4. (On April 17th, we threw in two sandbags between the screen pump rooms of Unit 1 and 2, and five sandbags between the screen pump rooms of Unit 2 and 3, seven sandbags in total, and finished the work at 11:15am.)

In order to prevent water containing radioactive materials from spilling from a plant's port to the sea, we installed 120 meter wide double silt fences around a breakwater on the south of the station at 10:45am on April 11th. On April 12th, 13th and 15th, we installed a total of 7 iron plates in front of the screen of Unit 2. At 1:50pm on April 13th, we installed silt fence (double layered) in front of Unit 3 and 4 screens. In addition, we are thinking about using other measures such as steel sheet pile or radioactive material absorber at around south breakwater.

Iodine and Cesium were detected from the water sampled in the pit and in the sea near the pit. On April 13th, Iodine-131, Cesium-134 and Cesium-137 were detected from the water sampled in the pit and in the sea in front of the bar screen near the pit. Other nuclide will be re-evaluated. In addition, from April 2nd, we implement sampling at 15km offshore Fukushima Daiichi and Fukushima Daini Nuclear Power Stations(3 points have been added since April 5th. 4 points at 3km offshore Fukushima Daiichi Nuclear Power Station and 2 points at 8km offshore have been added since April 17th) and will evaluate these samples comprehensively.

From 7:35pm on April 12th, we started transferring accumulated water in the vertical shaft of Unit 2 to the condenser. At 11:00am on April 13th, we stopped transferring accumulated water to check whether there was water leakage from condenser or not. As we did not find any problem, we restarted transferring at 3:02pm, March31, of the same day. At 5:04pm, the scheduled transfer was completed.

- Since approx. 9:20am, March 31st, the water transfer from the vertical shaft of Unit 1 to the reservoir of the centralized environmental facility was conducted. We finished the task around 11:25am of the same day.
- We found the accumulated water at the main process building of the centralized environmental facility. We analyzed and detected approx. 1.2 x 10^1Bq/cm³ of radioactivity in full dose in the Controlled Area and 2.2 x 10^1Bq/cm³ in full dose in the Non-Controlled Area on March 29th. On April 2nd, the transfer of water accumulated in the central environment facility to the turbine building of Unit 4 was started for the purpose of the draining that water.
- From April 3rd, the water level in the trench of Unit 3 increased by 15 cm. The route is not yet known, but there is a possibility that water in the turbine building of Unit 4 may be running to the trench of Unit 3. To be safe, at 9:22am, April 4th, we stopped transferring water to the turbine building of Unit 4. At this moment, the water level in the trench of Unit 3 became stable after stopping the water transfer.
- There is plenty of radioactive wastewater in the turbine buildings. Especially, Unit 2's wastewater is very highly radioactive. To store this stably, it was decided that this needed to be transferred to the Centralized Radiation Waste Treatment Facility. However, in that facility, ten thousand tons of low level radioactive wastewater is stored. In order to transfer more wastewater, we need to discharge the low level radioactive wastewater. In addition, as low radioactive subsurface water is piling up in sub-drain pits of Units 5 and 6 and a part of subsurface water is running into buildings. We are concerned that important equipment to secure the safety of reactors may be submerged. Based on the Section 1 of the Article 64 of the Nuclear Reactor Regulation Law, we have decided to discharge to the sea approx. ten thousand tons of the accumulated low level radioactive water and the low level radioactive subsurface water stored in the sub drain pits of Units 5 and 6 as soon as we get ready. From 7:03pm, April 4th, we started discharge of the low level radioactive wastewater stored in the Centralized Radiation Waste Treatment Facility to the ocean from the south of the water discharge canal. The discharge was finished at 5:40 pm, April 10. Total amount of discharged water is approximately 9,070 tons. Also, from 9:00pm, April 4th, we started discharging the low level radioactive wastewater stored in the sub drain pits of Units 5 and 6 to the ocean from the water discharge canal of Units 5 and 6. At 6:52pm, April 9th we finished discharging water. The amount of water was approximately 1,323 tons.

  The total amount of emitted radioactivity is approximately 1.5*10^{11} Becquerel. We evaluate approximately 0.6 mSv of effective radioactive doses per year per an adult as the impact on the discharge of the low radioactive stored water to the ocean if an adult eats adjacent fish and seaweeds every day. The amount (0.6 mSv of effective radioactive doses per year) is one-forth of annual radioactive dose (2.4 mSv) to which the general public is exposed from nature and equivalent to that when we evaluated before discharging the water to the ocean.

  On April 7th, we knocked holes in the external walls of turbine buildings at Units 2 to 4 for the preparation of draining the accumulated water to the Centralized Radiation Waste Treatment Facility.

  On April 18th, in terms of the transfer of high level radioactive wastewater to the Centralized Radiation Waste Treatment Facility, measures to prevent leakage in the facility building was completed. After reporting the necessity of the transfer, the assessment of safety and principle of the permanent storage of the wastewater and treatment facility to Minister of Economy, Trade and Industry with the confirmation by Nuclear and Industrial Safety Agency, the wastewater transfer from the vertical shaft of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility was started from 10:08 am on April 19th. (As of 7am on April 21st, the water level in the trench of the Unit 2 turbine building keeps decreasing.)
- We conducted nuclide analysis on sub drain water near the turbine buildings and detected Iodine-131, Cesium-134 and Cesium-137 on April 6th and 13th. As a radioactive dose of the sample collected on April 13th increased compared to that of April 6th, we received an oral instruction from Nuclear and Industrial Safety Agency to strengthen the monitoring. In response, we increased the frequency of

the sampling of the sub drain water of Units 1 to 6 and deep well located in the station from once a week to three times a week. We detected Iodine-131, Cesium-134 and Cesium-137 at the sampling survey on April 16th and 18th.

<Freshwater supply>

- The first barge of the United States Armed Forces with fresh water to be used to cool down reactors etc. was towed by a ship of Maritime Self-Defense Force and docked at 3:42pm on March 31st. At approx. 3:58pm, April 1st we started to replenish filtrate tanks with the fresh water, and finished at 4:25pm. At approx. 10:20am, April 2nd, we resumed replenishing filtrate tanks with the fresh water, and finished at 4:40pm.
- The second barge of the United States Armed Forces with the fresh water to be used to cool down reactors etc. was towed by the ship of Maritime Self-Defense Force came alongside the pier at approx. 9:10am, April 2nd.
- We began to transfer fresh water from the second barge to the first barge at 9:52am, April 3rd and finished at 11:15am.
- At 11:35am, April 1st, a worker fell into the sea while stepping into the ship from the pier during the hose laying work of the barge. Other crew immediately rescued the worker. While no injury or contamination was confirmed, whole body counter has been implemented to check the contamination inside the body just in case.

<Spraying dust inhibitor>

- From 3:00pm on April 1st, we started spraying dust inhibitor in order to prevent diffusion of radioactive materials on a trial basis. (The past results are as follows:)

April 1st: At the mountain side area of the common spent fuel pool/ Square measure: approx. 500m^2

April 5th: At the east and south sides of Unit 4 and the mountain side area of the common spent fuel pool / approx. 600m^2 in total

April 6th: At the mountain side area of the common spent fuel pool/ approx. 600m^2

April 8th: At the mountain side area of the common spent fuel pool/ approx. 680m^2

April 10th: At the mountain side area of the common spent fuel pool/ approx. 550m^2

April 11th: At the mountain side area of the common spent fuel pool/ approx. 1,200m^2

April 12th: At the mountain side area of the common spent fuel pool/ approx. 700m^2

April 13th: At the mountain side area of the common spent fuel pool/ approx. 400m^2

April 14th: At the mountain side area of the common spent fuel pool/ approx. 1,600m^2

April 15th: At the mountain side area of the common spent fuel pool/ approx. 1,900m^2

April 16th: At the mountain side area of the suppression pool water surge-tank/ approx. 1,800m^2

April 17th: At around the Centralized Radiation Waste Treatment Facility/ approx. 1,900m^2

April 18th: At around the Centralized Radiation Waste Treatment Facility/ approx. 1,200m^2

April 20th: At around the Centralized Radiation Waste Treatment Facility/ approx. 1,900m^2

April 21st: At the mountain side area of the common spent fuel pool/ approx. 1,300 m^2 /at the mountainside area of the medium voltage switchgear/ approx.5,100 m^2.

<Common spent fuel pool>

- On March 18th, regarding the spent fuel in the common spent fuel pool*, we have confirmed that the water level of the pool was secured. At around 10:37am March 21st, water spraying to common spent fuel pool has started and finished at approx. 3:30pm. At around 6:05pm, fuel pool cooling pump was activated to cool the pool.

*common spent fuel pool: a spent fuel pool for common use set in a separate building in a plant site in order to preserve spent fuel which are transferred from the spent fuel pool in each Unit building.

- At 2:34 pm, April 17th, the occurrence of a short circuit caused by the lack of repair of the end of the unused cable which is connected parallel to the power of spent fuel common pool caused the circuit breaker of the power side to open resulting in suspended power supply to the spent fuel common pool. However, at 5:30 pm,

April 17th, the power of the spent fuel common pool was restored after the removal and inspection of the cable.

<Dry cask building>

- On March 17th, we patrolled buildings for dry casks* and found no signs of abnormal situation for the casks by visual observation. A detailed inspection will be conducted hereafter.

  *dry cask: a measure to store spent fuel in a dry storage casks in storages. Fukushima Daiichi Nuclear Power Station started to utilize the measure from August 1995.

<Injured / ill health> (Latest)

- Approx. 11:10am on April 10th, at the yard of Unit 2, a worker who wore an anorak and a full face mask said that he felt sick while he was laying a discharging hose. A medical staff accompanied him from Fukushima Daini Nuclear Power Station to J-Village conducting a course of injections in the car. After that, at 2:27pm, he was sent to Sougou Iwaki Kyoritsu Hospital by an ambulance. No radioactive material attached to his body.
- No injured workers inside of the building were confirmed due to the earthquake which occurred at approximately 5:16pm, April 11th.

<Others>

- From 3:59pm to 4:28pm on April 10th, we conducted video recording of Units 1 to 4 reactor buildings from the air by using an unmanned helicopter to check the current status.
- From 10:17am to 12:25pm on April 10th, we conducted video recording of Unit 4 reactor building and its surrounding area by using an unmanned helicopter.
- From 8:02am to 9:55am on April 15th, we conducted video recording of Units 1 to 4 reactor buildings from the air by using an unmanned helicopter to check the current status.
- From 11:43am to 0:50pm on April 21st, we conducted video recording of Unit 1 to 4 reactor building and its surrounding area by using an unmanned helicopter.
- From 11:30 am to 2:00 pm, April 17th, we confirmed plant conditions (radiation dose, temperature, measurement of oxygen density, etc) using the remote-controlled robot. In addition, we confirmed the plant conditions inside of Unit 1's reactor building from 4:00 pm to 5:30 pm, April 17th.
- From 1:42 pm to 2:33 pm on April 18th, site conditions within Unit 2 Reactor Building (measurement of radiation dose, temperature, oxygen density, etc) were checked using a remote control robot.

Fukushima Daini Nuclear Power Station

Units 1 to 4: Shutdown due to the earthquake

- The national government has instructed evacuation for those local residents within 10km radius of the periphery.
- In order to achieve cold shutdown, reactor cooling function was restored and cooling of reactors was conducted. As a result, all reactors achieved cold shutdown; Unit 1 at 5:00pm, March 14th, Unit 2 at 6:00pm, March 14th, Unit 3 at 0:15m, March 12th, and Unit 4 at 7:15am, March 15th.
- At 2:30pm on March 30th, the power source of the residual heat removal system (B) to cool the reactor of Unit 1 was secured from an emergency power source in addition to an offsite power. This means that all the units secure backup power sources (emergency power sources) for the residual heat removal system (B).
- As radiation dose measured at site boundary exceeded the threshold amount, it was determined on March 14th and 15th that a specific incident stipulated in article 10, clause 1(increase of radiations dose at site boundary) occurred. However, the measured amount has been below the threshold amount of 5 μSv/h afterwards. Site will be under continuous surveillance.

【Unit 1】

- As it was confirmed that the temperature of the Emergency Equipment Cooling

Water System * was increasing, at 3:20pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 4:25pm, March 15th, after replacing the power facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

【Unit 4】

- As it was confirmed that the pressure at the outlet of the pumps of the Emergency Equipment Cooling Water System* was decreased, at 8:05pm, March 15th, we stopped the Residual Heat Removal System (B) for the inspection. Subsequently, failure was detected in the power supply facility associated with the pumps of the Emergency Equipment Cooling Water System. At 9:25pm, March 15th, after replacing the relevant facility, the pumps and the Residual Heat Removal System (B) have been reactivated.

*: emergency water system in which cooling water (pure water) circulates which exchanged the heat with sea water in order to cool down bearing pumps and/or heat exchangers etc.

Kashiwazaki Kariwa Nuclear Power Station

- Units 1, 5, 6, and 7: Normal operation (Units 2 to 4: Outage due to regular inspections)

END