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 declared the area within 20km radius of the site as a "no-go zone" and between 20km and 30km radius of the site as a "stay-indoors zone."
- 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 to 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 by 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 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 was continued.
- Water injection to the reactor was temporarily suspended due to 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 reactor, injecting water was temporarily suspended. After replacement, we restarted injecting water by pumps.
- Before the work to connect high voltage power panels of Unit 1/2 and Unit 5/6 was initiated, the power source of pumps to inject water to reactors was switched to a temporary diesel generator at 10:57 am on April 25th. At 6:25pm on April 25th, the power source was switched back to the power system.
- In order to identify the appropriate injection amount of water in making the fuels submerged in water, at 10:02 am, April 27th, we started the operation to increase the amount of water to the reactor of Unit 1 from approx. 6 m^3/h. By monitoring the parameters, we injected approximately 10 m^3/h of freshwater to the reactor. From 10:14 am, April 29th, we put the amount of injecting freshwater back to approximately 6m^3/h into the reactor and continue injecting freshwater.
- At 10:01 am on May 6th, in order to submerge nuclear reactor in water, we have increased the amount of injecting freshwater from approximately 6m^3/h to approximately 8m^3/h.
- We calibrated water level gauge of the reactor of Unit 1 from May 10th to 11th.
- We calibrated pressure gauge of the primary containment vessel of Unit 1 on May 11th.
- At 1:28 pm on May 15, we have increased the amount of freshwater injected into the reactor from approximately 8m³/h to approximately 10m³/h so that we can monitor the trend shift of parameters of the Reactor Pressure Vessel as well as the Primary Containment Vessel, the shift which would be resulted from the increase of the amount of injected freshwater.
- Trend monitoring of how the parameters of reactor pressure vessel and primary

containment vessel varied when water injection to Unit 1 reactor increased, was completed. At 11:50 am on May 17th, water injection rate to the reactor was changed from approx. 10 m^3/h to approx. 6 m^3/h.

<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.
- From 3:07 pm to 3:18 pm on May 14th, we sprayed freshwater into the spent fuel pool of Unit 1 with the concrete pumping vehicle (We broke off due to a strong wind).
- From 3:06 pm to 4:15 pm on May 20th, we sprayed freshwater into the spent fuel pool of Unit 1 with the concrete pumping vehicle (We broke off due to a strong wind).
- From 3:22 pm on May 22nd, we started spraying water into the spent fuel pool of Unit 1 by a concrete pumping vehicle, and finished at 5:09 pm.
- From 4:47 pm to 5:00 pm on May 28th, we conducted the leak test for Unit 1 spent fuel pool by fresh water injection using Fuel Pool Cooling and Filtering System.

<Draining water from the underground floor of the 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 12:00pm, 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 9:30am, 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. Then, 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.
- Regarding the work to connect high voltage power panels of Unit 1/2 and Unit 5/6, that of Unit1/2 became temporarily offline and a pump to inject nitrogen was stopped from 2:10 pm on April 25th. At 7:10pm on the same day, we restated the pump.
- The pump to inject nitrogen to Unit 1 was stopped from 8:51 am on May 11 since part of power source of Unit 1 & 2 had been switched to Okuma Line No.2. Restarted at 3:58 pm, on May 11th.
- At approx. 2:00 pm, May 21st, nitrogen injection to the vessel was stopped (The compressor stopped due to "High temperature".) On the same day, the back-up supply facility was started up (approx. 20m3/h) at 5:00pm. The amount of nitrogen was increased to approx. 26 m3/h at 8:31pm. At 10;56 am, on May 22nd We stopped the back-up supply facility. At 11:23 am, on May 22nd, we started the nitrogen gas injection pump for Units 2 and 3 (increased to approx 28m3/h).
- Due to the change of onsite power source structure after the restoration of Okuma No. 2 line, power source to electromagnetic valve in nitrogen injection line was switched. In order to switch to the temporal power source, nitrogen injection was temporarily suspended at 9:14 am May 25th and was resumed at 9:18 am May 25th. When we suspended nitrogen injection from 3:16pm to 3:18pm on May 25th and checked the operation condition in order to switch to the permanent power

source, at 3:45pm, we found that the nitrogen injection compressor was stopped. At 7:44pm on the same day, we started a substitution compressor and injecting nitrogen at about 28m³/h.

<Improvement of working environment>

- On May 2nd, we started work to install the local exhausters in order to improve the working environment in the reactor building.
- At 4:36pm on May 5th, we started to ventilate with 6 local exhausters the reactor building of Unit 1 in order to improve the working environment of the building.
- Consequently, we confirmed that radioactivity density inside of the reactor building decreased enough, and opened the double doors (removed the duct of the local exhauster) of the reactor building at 8:08 pm on May 8th. After removing sheets used for the installation of the local exhausters, we opened the double doors of the reactor building at 4:17 am on May 9th. Then, we confirmed air dose rate as of 5:00 am and evaluated that there was no impact on the surrounding area.

<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.
- From 4:00pm to 5:30pm, April 17th, the condition (radiation dose, temperature, oxygen density) inside the reactor building of Unit 1 was observed by a remote-controlled robot.
- From 11:35 am to 1:24pm, April 26th, the condition inside the reactor building of Unit 1 was observed by a remote-controlled robot and we confirmed that there was neither major change in the radiation dose nor significant water leakage from the Primary Containment Vessel.
- From 11:36 am to 2:05pm, April 29th, the condition inside the reactor building of Unit 1 was observed by a remote-controlled robot and we confirmed that there was no significant water leakage from the Primary Containment Vessel.
- From 4:01 pm to 5:39pm, May 13th, the condition inside the reactor building of Unit 1 was observed by a remote-controlled robot.
- Preparatory work to cover reactor building was initiated on May 13th.
- May 20th, our staffs went into the reactor building of Unit 1 to measure the water level and radiation level by γ camera.
- From 12:30 p, to 1:50 pm, on May 22nd, we sampled, on a trial basis, radioactive materials in the ambient air at the opening of the Reactor Building, Unit 1. As a result of analysis, Iodine 134, Cesium 134, and Cesium 137 were detected.

【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 partner companies' workers not in charge of water injection work started tentative evacuation to a safe location. Sea water injection to the reactor continued.
- At approx. 9:24 am, May 18th, the first workers went into the reactor building after the occurrence of abnormal sound near the suppression chamber

<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 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
- Before the work to connect high voltage power panels of Unit 1/2 and Unit 5/6 is initiated, the power source of pumps to inject water to reactors was switched to a temporary diesel generator at 10:57 am on April 25th. Offsite power was restored at 6:25 pm.

<u><Water spray to the spent fuel pool></u>

[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. 4:07pm to 5:01pm 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.

[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 the pump was switched to a 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.
- Freshwater injection through Fuel Pool Cooling and Filtering System

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

From 3:55pm to 5:40pm on April 22nd: water injection using the temporary motor driven pump

From 10:12am to 11:18am on April 25th: water injection using the temporary motor driven pump

From 10:15am to 11:28am on April 28th: water injection using the temporary motor driven pump

From 10:05am to 11:40am on May 2nd: water injection using the temporary motor driven pump

From 9:36am to 11:16am on May 6th: water injection using the temporary motor driven pump

From 1:09pm to 2:45pm on May 10th, water injection through Fuel Pool Cooling

and Filtering System (hydrazine was added for the period from 1:19pm to 2:35pm)

From 1:00pm to 2:37 on May 14th, water injection through Fuel Pool Cooling and Filtering System (hydrazine was added for the period from 1:08pm to 2:02pm)

From 1:10 pm to 2:40 pm, on May 18th, we injected freshwater to the spent fuel pool of Unit 2 by the spent fuel pool cooling and filtering system (from 1:15 pm to 2:30 pm, injected hydrazine at the same time)

From 1:02 pm to 2:40 pm, on May 22nd, we injected freshwater to the spent fuel pool of Unit 2 by the spent fuel pool cooling and filtering system (from 1:04 pm to 2:03 pm, injected hydrazine at the same time)

< Nuclide analysis of spent fuel pool water>

- 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.

< Cooling of spent fuel pool by alternative system>

- On May 24th, a heat exchanger installation work was conducted.
- On May 25th, a pipe connecting work was conducted.

< Draining water from the underground floor of the 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.
- The water transfer from the trench to Centralized Radiation Waste Treatment Facility (Process Main Building) was started at 10:08 am, April 19th. (please refer to <Others> section for following status)
- At 2:45 pm on May 26th, we started to remove water from the condenser of the turbine building in order to be prepared for the construction for water injection through feed water system piping arrangement into the reactor of Unit 2.Completed at 2:30 pm on May 27th.

<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.
- From 1:42pm to 2:33pm, April 18th, the condition (radiation dose, temperature, oxygen density) inside the reactor building of Unit 2 was observed by a remote-controlled robot

【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 workers from partner 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 for implementing 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 is not a situation to immediately implement such measures and discharge air containing radioactive material to outside. We will continue monitoring the status of the pressure of the reactor containment vessel.
- At approx. 3:55pm, March 21st, we confirmed light gray smoke was 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 any significant changes. However, workers around Unit 3 evacuated indoors as a precautionary measure. On March22nd, the color of smoke changed to somewhat white and it was slowly disappearing.
- At approx. 4:20pm on March 23rd, we observed light black smoke was 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 any significant changes. Just to be safe, workers around Unit 3 evacuated indoors. 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.
- At approx. 4:30 pm, May 18th, the first workers went into the reactor building after the occurrence of white smoke.

<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 12:16pm 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 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 was 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 reactor, injecting water was temporarily suspended. After replacement, we restarted injecting water by pumps
- Before the work to connect high voltage power panels of Unit 1/2 and Unit 5/6 was initiated, the power source of pumps to inject water to reactors to a temporary diesel generator was switched at 10:57 am on April 25th. Offsite power was restored at 6:25 pm.

- At 10:09 am May 4th, we increased the volume of water injection to the reactor from approximately 7m^3/h to 9m^3/h, following an increase of temperature at the reactor pressure vessel.
- At 4:53 pm on May 12th, as a part of work to switch the water injection line to the nuclear reactor of Unit 3 from the fire extinction system piping arrangement to the reactor feed water system piping arrangement, we started water injection through the reactor feed water system piping arrangement at approximately 3 m3/h in addition to the fire extinction system piping arrangement at approximately 9 m3/h.At 4:01 pm on May 13th, we changed water injection amount to through the fire extinction system piping arrangement at approximately 6 m^3/h and the reactor feed water system piping arrangement at approximately 6 m^3/h. At 10:01 am on May 14th, we increased water injection to the nuclear reactor of Unit 3 through the fire extinction system piping arrangement from at approximately 6 m^3/h to 9 m^3/h. (water injection thorough the reactor feed water system piping arrangement is maintained at approximately 6 m^3/h).
- At 2:33 pm, on May 15th, started injection of boric acid to the reactor and finished at 5:00 pm, May 15th.
- At 10:11 am, May 17th, amount of water injection to Unit 3 reactor by feed water system piping was increased from approx. 6 m^3/h to approx. 9 m^3/h.
- At 2:15 pm, May 20th, amount of water injection to Unit 3 reactor by feed water system piping was increased from approx. 9 m^3/h to approx. 12 m^3/h. At 5:39 on the same day, amount of water by fire protection system piping was gradually decreased from approximately 9 m^3/h, reached to 6 m^3/h at 11:54 pm.
- In order to switch the facility for water injection to the reactor from reactor feed water system piping arrangement to electric water-injection pump placed on a hill, the conventional fire pump was stopped at 3:12pm on May 21st and electric water-injection pump was started up at 3:15pm (we maintained the amount of injection water at about 13.5m³/h*). * Adjustment in the amount of injecting water due to the replacement of the flowmeter (about 12m³/h → 13.5m³/h).
- On May 23rd, we changed the rate of water injection to Unit 3 through the fire extinction system piping arrangement from approximately 6m³/h to approximately 5m³/h at 11:31 am and from approximately 5m³/h to approximately 4m³/h at 2:08 pm. We changed the rate of water injection through the fire extinction system piping arrangement from approximately 4m³/h to approximately 3m³/h at 5:19pm.
- At 8:52 pm on May 26th, we changed the rate of water injection to the reactor through the fire extinction system piping arrangement from approximately 3 m3/h to approximately 2 m3/h.
- At 8:42 pm on May 27th, we changed the rate of water injection to the reactor of unit3 through the fire extinction system piping arrangement from approximately 2 m^3/h to approximately 1 m^3/h.
- At 8:54 pm on May 28th, we stopped water injection to the reactor of Unit 3 through the fire extinction system.

<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 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. 9:36pm, 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. 11:03am 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.

[Freshwater 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/ From 2:19pm to 3:40pm, April 22nd
- From 1:40pm to 2:00pm on April 22nd, we injected fresh water by the Fuel Pool Cooling and Filtering System on a trial basis.
- On April 26th, spraying of fresh water by concrete pumping vehicle was conducted (for around 2 minutes) in order to check the water level of spent fuel pool. After that, from 12:25 pm to 2:02 pm, fresh water injection by spent fuel pool cooling and filtering system was conducted.
- On May 8th, water was injected through spent fuel pool cooling and filtering system from 12:10 pm to 2:10 pm.
- At 12:14 pm on May 9th, we started injection of fresh water into Unit 3 spent fuel pool using spent fuel pool cooling and filtering system (from 12:39 pm to 2:36pm, hydrazine was also injected). The injection was finished at 3:00pm.
- At 3:00 pm on May 16th, we started injection of freshwater into Unit 3 spent fuel pool using spent fuel pool cooling and filtering system (from 3:10 pm to 5:30 pm, hydrazine was also injected). The injection was finished at 6:32 pm.
- At 10:15 am on May 24th, we started injection of freshwater into Unit 3 spent fuel pool using spent fuel pool cooling and filtering system (from 10:20 am to 0:56 pm, hydrazine was also injected). The injection was finished at 1:35 pm.
- At 1:28 Pm on May 28th, we started freshwater injection to the spent fuel pool of Unit 3 by the fuel pool cooling and filtering system (we also injected hydrazine from 1:42 Pm to 2:40 pm). The injection was finished at 3:08 pm.

< Nuclide analysis of spent fuel pool water>

- On May 8, we took approximately 40ml of pool water using concrete pumping vehicle, in order to check the status within the spent fuel pool. On May 10, we conducted a nuclide analysis with the collected pool water, and detected Cesium-134, Cesium-136, Cesium-137, and Iodine-131. We will conduct further detailed analyses.

< Draining water from the underground floor of the 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. At approx. 8:40am, March 31st, transfer was completed.
- In order to change the water injection line into the reactor to Reactor Feed Water System, draining water from the condenser in the turbine building was started at 4:18pm on May 8th. We cut a part of pipes of Reactor Feed Water System.
- On May 10, laying out transferring pipes to transfer the accumulated water in the turbine building to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building) was started and completed on May 11th. On May 12, we completed a leak check. On May 17th, we finished a

leak check on transferring pipes and stated to transfer at 6:04 pm (approx. 12m³/h). Transfer was suspended at 9:10am May 25th in order to check the transfer lines and buildings.

<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.
- From 11:30am to 2:00pm, April 17th, the condition (radiation dose, temperature, oxygen density) inside the reactor building of Unit 3 was observed by a remote-controlled robot.
- On May 10th, in order to place an alternative cooling facility, we started removing the debris using robots and unmanned heavy machinery.

【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 sign of fire.

<Water spray to the spent fuel pool>

[Freshwater spray]

- From 8:21am to 9:40am, March 20th, water was sprayed by fire engines with the cooperation of Self-Defense Forces. From approx. 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 1:02pm March 23rd
  - From 2:36pm to approx. 5:30pm March 24th
- From 6:05am to 10:20am, March 25th, sea water was injected by the Fuel Pool Cooling and Filtering System.
- Seawater was sprayed by the concrete pumping vehicle;
  - From 7:05pm to 10:07pm, March 25th / From 4:55pm to 7:25pm March 27th

[Freshwater spray]

- From 2:04pm to 6:33pm March 30th, fresh water was sprayed by the concrete pumping vehicle (water spray was switched to fresh water)
- Fresh water was sprayed by the concrete pumping vehicle;
  - 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/From 5:52pm to 11:53pm, April 22nd
  - From 12:30pm to 4:44pm, April 23rd / From 12:25pm to 5:07pm, April 24th
  - From 6:15pm on April 25th to 12:26am on April 26th
  - From 4:50pm to 8:35pm, April 26th
  - From 12:18pm to 2:01 pm and from 2:32pm to 3:15pm, April 27th
  - From 12:19pm to 8:46 pm, May 5th/ From 12:38 pm to 5:51 pm, May 6th
  - From 2:05 pm to 5:30 pm, May 7th / From 4:30 pm to 7:30 pm, May 19th
  - From 4:05 pm to 7:05 pm, May 9th (hydrazine: from 4:11 pm to 6:38 pm)

- From 4:04 pm to 7:04 pm, May 13th (hydrazine: from 4:20 pm to 6:41 pm)
- From 4:25 pm to 8:25 pm, May 15th (hydrazine: from 4:26 pm to 6:30 pm)
- From 4:14 pm to 8:06 pm, May 17th (hydrazine: from 4:40 pm to 6:35 pm)
- From 4:00 pm to 7:56 pm, May 21st (hydrazine: from 4:23 pm to 7:00 pm)
- From 4:00 pm to 7:09 pm, May 23rd (hydrazine: from 4:08 pm to 6:30 pm)
- From 4:36 pm to 8:04 pm, May 25th (hydrazine: from 4:42 pm to 6:49 pm)
- From 5:05 pm to 8:00 pm, May 27th (hydrazine: from 5:24 pm to 6:53 pm)
- From 5:56 pm to 7:45 pm, May 28th (hydrazine: from 6:02 pm to 7:45 pm)

[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 and detected Cesium-134, Cesium-137, and Iodine-131. We are planning to conduct more detailed analysis hereafter.
- From April 22nd, we installed the thermocouple-type thermometer and the radiation dose meter to the concrete pumping vehicle at the spent fuel pool of Unit 4 and we investigated the water level of pool, water temperature, radiation dose, water analysis etc. As part of the investigation, we sampled 150 ml of water from the pool on April 28 and conducted nuclide analysis on April 29. As a result of the analysis, cesium 134, 137 and iodine 131 were detected. We sampled 280 ml of water from the pool on May 7 and conducted nuclide analysis on May 8. As a result of the analysis, cesium 134, 137 and iodine 131 were detected.

<Installation of support structure for the base of Spent Fuel Pool>

- On May 9th, preparatory work to install support structure was started.

<Others>

- On March 21st, cabling was completed from the 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.
- From 2:17 pm to 2:37 pm o May 23rd, we sampled, on a trial basis, radioactive materials in the ambient air at the opening of the Reactor Building, Unit 4. As a result of analysis, Iodine 134, Cesium 134, and Cesium 137 were detected.

【Unit 5】

- 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).
- Unit 5 has been in reactor cold shutdown since 2:30pm 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 Unit 5.
- 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 reactors at 4:35pm.
- Regarding the work to connect high voltage power panels of Unit 1/2 and Unit 5/6, the pump of the residual heat removal system to cool the reactor and spent fuel pool in Unit 5 was stopped from 12:22 pm on April 25th. At 4:43pm on the same day, we restated the pump.
- From March 27th to May 2nd, transfer of accumulated water in Unit 5 turbine building to a condenser was conducted (approximately 600m^3).
- At 9:14 pm on May 28th, we found that one temporary residual heat removal system seawater pump of Unit 5 stopped. At 8:12 am on May 29th, replacement work to the spare pump started.

【Unit 6】

- At 10:14pm March 19th, we started cooling the spent fuel pool of Unit 6 by activating the Residual Heat Removal System Pump (B).
- 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 Unit 6.
- From 11:00 am to 3:00 pm on April 19th, accumulated water from the basement of the turbine building of Unit 6 was transferred into the condenser.
- The transfer of accumulated water in Unit 6 turbine building to a temporary tank was started at 2 pm on May 1st. At 5:00 pm, on May 1st, transfer pump was stopped (approximately 119.8m^3). After that, the results of the transfer are shown below.

  From 10:00 am to 4:00 pm on May 2nd (approximately 222.3m^3)
  From 2:00 pm to 5:00 pm on May 3rd (approximately 124.1m^3)
  From 2:00 pm to 5:00 pm on May 6th (approximately 111.7m^3)
  From 10:00 am to 3:00 pm on May 7th (approximately 184.1m^3)
  From 2:00pm to 5:00 pm on May 9th (approximately 94.7m^3)
  From 10:00 am to 4:00pm on May 10th (approximately 118.2m^3)
  From 10:00 am to 4:00 pm on May 11th (approximately 118.9m^3)
  From 10:00 am to 4:00 pm on May 12th (approximately 116.9m^3)
  From 10:00 am to 3:00 pm on May 13th (approximately 102.2m^3)
  From 10:00 am to 3:00 pm on May 14th (approximately 96.3m^3)
  From 10:00 am to 3:00 pm on May 15th (approximately 94.3m^3)
  From 10:00 am to 2:00 pm on May 16th (approximately 76.6m^3)
  From 10:00 am to 2:00 pm on May 17th (approximately 75.3m^3)
  From 10:00 am to 2:00 pm on May 18th (approximately 83.6m^3)
  From 2:00 pm to 6:00 pm on May 21st (approximately 45.3m^3)
  From 9:00 am to 7:00 pm on May 24th (approximately 201.0m^3)
  From 9:00 am to 7:00 pm on May 25th (approximately 378.0m^3)
  From 9:00 am to 7:00 pm on May 26th (approximately 378.0m^3)
  From 9:00 am to 7:00 pm on May 27th (approximately 381.5m^3)
  From 9:00 am to 7:00 om on May 28th(amount being valuated)

  Amounts are estimated value.
  After detail checking, values are corrected.

- From 11:00am to 12:30am May 10, we conducted water transfer from the reactor building to the accessory building for reactors (the radiation waste treatment building) (Approximately 10 m^3). The results are shown below.

  From 11:00 am to 12:30 pm on May 10th
  From 11:00 am to 12:30 pm on May 11th
  From 11:00 am to 12:30 pm on May 12th
  From 11:30 am to 12:15 pm on May 13th
  From 10:30am to 12:30 pm on May 18th
  From 10:20am to 12:10 pm on May 28th

【Others】

<Securing offsite power reliability>

- On March 18th, with respect to Unit 2, receiving electricity from the external transmission line to the auxiliary power transformation installation was completed. At 3:46 pm on March 20th, after laying the cables from the installation towards the building side, receiving electricity by the load panel on the load side was started.
- At 10:23 am on April 19th, connection work between high voltage switchgear of Unit 1&2 and Unit 3&4 was completed.
- Before the work to connect high voltage power panels of Unit 1/2 and Unit 5/6 was initiated, the power source of pumps to inject water to reactors was switched to a temporary diesel generator at 10:57 am on April 25th. At 6:25pm on April 25th, the power source was switched back to the power system. The pump to inject nitrogen to Unit 1 was stopped from 2:10 pm on April 25th. At 7:10pm on the same day, we restated the pump. The pump of the residual heat removal system to cool the reactor and spent fuel pool in Unit 5 was stopped from 12:22 pm on April 25th. At 4:43pm on the same day, we restated the pump.
- Since April 26th, aiming to increase the power supply capacity in future as well as to strengthen the insulation, we have switched the power source of Unit 3 & 4 from the current "Okuma line No.3" to "Toden Gensiryoku line" in line with the construction work to raise the voltage of the offsite power of Unit 3 & 4 from 6.9 kV

to 66 kV. On April 30th, we finished upgrading the voltage and switching the power source of Unit 3 & 4 to “Okuma line No.3”.

- Okuma Line No.2 (275,000 V) has been restored. Since 3:20 pm on May 11th, Unit 1 and 2 are receiving power partly from the line.
- At 7:35 pm, May 17th, we completed the switch of power for the power station by the increase of voltage of Okuma Line No.3.

<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, April 4th, 7th, 11th,14th, 21st, 25th and 28th, May 2nd and 5th. We strengthened environmental monitoring of power station and surrounding environment just in case. As a result of nuclide analysis of gamma (γ)-rays of the soil using the aforementioned sample, additionally, Iodine, Cesium, Tellurium, Barium, Niobium, Ruthenium, Molybdenum, Technetium, Lanthanum, Beryllium, Silver have been detected.
- We collected the soil at the site of Fukushima Daiichi Nuclear Power Station on March 28th and April 11th and as a result of uranium assay, detected Uranium-234, 235 and 238 which are the same level as that occurs naturally.
- Out of the soil samples gathered on March 28th, we conducted the nuclides analysis on two samples from which Plutonium were detected to confirm Americium and Curium. We detected Americium 241 and Curium 242, 243 and 244. Also, out of the soil samples gathered on April 4th, we conducted the nuclides analysis on one sample from which Plutonium were detected to confirm Americium and Curium. We detected Americium 241 and Curium 242, 243 and 244.
- Strontium 89 and 90 have been detected from samples collected on April 18th from 3 regular sampling points.

[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) had 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 and from March 23rd to May 26rd. The data of three detected nuclides (Iodine-131, Cesium-134 and Cesium-137) were reported as fixed data. The valuation results of other nuclides were published based on the improved methods for recurrence prevention prepared in accordance to the strong warning by NISA on April 1st.
- Since permanent monitoring posts (MPs 1 to 8) were restored, we keep monitoring and publicly announce the data from them.
- May 20th, we implemented improvement of environment for a part of 8 monitoring posts (No.8) installed at the boundary of station site, by decontamination of detector and installation of cover under the detector. On May 23rd, we improved the environment around a monitoring post No.3 by decontaminating the detector

and installing a shield to the lower half of the detector.

[Water]

- On March 21st and from March 23rd to May 26rd 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. The valuation results of other nuclides were published based on the improved methods for recurrence prevention 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 institutions and companies (Japan Atomic Energy Agency and Japan Nuclear Fuel Limited).
- At approx. 3:30pm, March 27th, we found water accumulating in vertical shafts of trenches 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 shafts of the trenches 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.
- 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 any changes 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 did not come 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 specialists for water shutoff and procured required 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 approximately 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.

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 implemented 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 newly added since April 17th. On April 25th, the monitoring at 5 locations at the offshore area of Ibaraki Prefecture was launched by Ministry of Education, Culture, Sports, Science and Technology. As part of its monitoring, Japan Coast Guard has conducted the sampling in seawater on April 29th and May 5th. We, Tokyo Electric Power Company, have conducted the nuclide analyses of that seawater. Iodine -131, Cesium -134 and Cesium -137 were detected. We will evaluate these samples comprehensively hereafter. On May 5th, we added samplings of upper and lower layers of 3km Souma-city offshore. From May 10th we will carry out the sampling of upper and lower layers at 6 points at 3 km offshore, and interval of the said sampling at 6 points will be changed to two times a week. On May 27th, we added samplings of upper, middle and lower layers at 2 points at 30km offshore, and upper and lower layers at 2 points at 5km offshore, and interval of the said sampling at 4 points will be once a week.

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 3:02 pm on the same day, and at 5:04 pm the scheduled transfer was completed.

- At 12:30 pm on May 11th, a worker engaged in blocking work of the vertical shaft around the water intake of Unit 3 found some water flowing through the pipes that store power cables into the vertical shaft. At 4:05 pm on the same day, we confirmed that the water outflows out of the shaft into the sea. We therefore inserted cloths into the pipes that lead to the shaft and put some concrete in it and at 6:45 pm, we confirmed the outflow stopped. We will continuously monitor the situation of the water outflow and check the result of sea water samplings around the water intake of Unit 3 and routes of water inflow and outflow.
- We estimated that the volume of outflow was approx. 250m^3 and the radioactive dose is approx. 2 x 10^{13} Bq on the assumption that it flew at the same rate for approx. 41 hours (from 2:00 am on May 10 to 7:00 pm on May 11). As preventive measures and measures to prevent scattering to the outside of the port, we are planning to block the pits the contaminated water might run flow out from, isolation of pump rooms for Units 1 to 4, installation of sandbags containing zeolite inside of the intakes, and installation of a circular purification equipment to the screen area. In parallel, we will continue monitoring sea water inside and outside of the port and reinforce the monitoring system.
- On May 12th, we conducted nuclide analysis on water in vertical shaft and neighborhood seawater, we detected Iodine-131, Cesium-134 and Cesium-137 on May 12th. We will conduct additional nuclide analysis.
- In order to prevent accumulated water from flooding out and to avoid sea water entry due to future tsunami, the vertical shaft of the trench is planned to be blocked by materials like concrete (Work has been started from May 1st at Unit 2).
- We decided to blockade each vertical shaft as a countermeasure against

Tsunami, and have started the work for Unit 2 and 3 since May 1st. (We already blockaded the vertical shafts of Unit 4 on April 6th.)

- 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 was already 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. Hence, based on the Section 1 of the Article 64 of the Nuclear Reactor Regulation Law, we 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 were 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 (From of 7am on April 22nd, the water level in the trench of the Unit 2 turbine building keeps decreasing). In order to check the transferring facilities and enhance the investigating function, transferring was temporarily suspended at 9:16 am on April 29th. The transfer was restarted at 2:05pm on April 30. At 9:22 am on May 7th, for the purpose of the construction work of changing water supply line for Unit 3

reactor to Reactor Feed Water System, we temporary suspended the transfer. At 4:02 pm on May 7th, we restarted the operation of transferring. Because of the same reason, at 9:01 am on May 10, we temporary suspended the transfer. At 3:20 pm on May 12th, we restarted the operation of transferring. Due to the stoppage of temporary power panel associated with the structure change, transfer was suspended at 9:05am May 25th. At 3:30pm on the same day, we restarted the transfer. At 4:01 pm on May 26th, considering the amount of water accumulated at Centralized Radiation Waste Treatment Facility, we stopped transferring the water.

- We will conduct a nuclide analysis at Fukushima Daini Nuclear Power Station, on the water transferred to the Centralized Radiation Waste Treatment Facility. We are planning to gain cooperation from other nuclear institutions or corporations.

- 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 a 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, 18th, 20th, 22nd 25th, 27th, 29th, May 2nd, 4th, 6th, 9th, 11th, 13th, 16th, 18th, 20th, 23th, 25th, and 27th.

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<Marine Soil>

- We conducted a nuclide analysis on marine soil collected on 29th April (at 2 points, 3km offshore of Fukushima Daiichi and Daini Nuclear Power Stations and Shallow Draft Quay). As a result, Iodine-131, Cesium-134 and Cesium-137 were detected.

<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.
- At 10:40 am, May 18th, two barge ships of the US military leave for Fukushima Daini Nuclear Power Station to bring the Mega Float for Fukushima Daiichi Nuclear Power Station. The Mega Float reached Fukushima Daini Nuclear Power Station at 1:30 om on the same day.

<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.

April 24th: At the mountain side of the nuclear reactor building of Unit 5/ approx. 860 m^2

April 25th: At the mountain side of the nuclear reactor building of Unit 5, slope in front of the former Administration Office Building, and gymnasium building / approx. 3,800 m^2

- Since around 1:30 pm, April 26th, we have started spraying the dust inhibitor in full swing (the record is shown below).

April 26th: spraying to the area on the coastal side of Units 1 to 4 using an unmanned crawler dump truck, approx 5,000 m^2.

April 27th: spraying to the area on the seaside of Unit 3 using unmanned crawler dump truck, approx 7,500 m^2

April 28th: spraying to the area on the mountain side of the nuclear reactor building of Unit 5 using the conventional method, approx. 4,540 m^2

April 29th: spraying to the area on the east side of the turbine building of Unit 4 using the unmanned crawler dump truck, approx. 7,000 m^2

April 29th: spraying to the area on the mountain side of the nuclear reactor building of Unit 5 using the conventional method, approx. 5,800 m^2

April 30th: spraying to the area on the south side of the turbine building of Unit 4 using the unmanned crawler dump truck, approx. 2,000 m^2

April 30th: spraying to the area on slope in front of the former Administration Office Building using the conventional method, approx. 5,400 m^2

May 1st: spraying to the area on the south side of the reactor building of Unit 4 using the unmanned crawler dump truck, approx. 1,000 m^2

May 1st: spraying to the area on slope in front of the former Administration Office Building using the conventional method (approx. 4,400 m^2).

May 2nd: spraying to areas on the south and west side of the reactor building of Unit 4 using the unmanned crawler dump truck (approx. 4,000 m^2)

May 2nd: spraying to areas including a slope in front of the former Administration Office Building using the conventional method (approx. 5,500 m^2)

May 3rd: spraying to areas on the west side of the reactor building of Unit 3 using the unmanned crawler dump truck (approx. 4,000 m^2)

May 3rd: spraying to areas including a slope in front of the former Administration Office Building using the conventional method (approx. 5,300 m^2)

May 4th: spraying to areas on the west side of the Unit 3 reactor building using the unmanned crawler dump truck (approx. 4,000 m^2)

May 4th: spraying to areas including the slope around the former Administration Office Building using the conventional method (approx. 5,200 m^2)

May 5th: spraying to areas on the west side of the Unit 2 reactor building using the unmanned crawler dump truck (approx. 4,000 m^2)

May 5th: spraying to areas including the mountain side of Shallow Draft Quay using the conventional method (approx. 5,350 m^2)

May 6th: spraying to areas on the west side of the Unit 1 reactor building using the unmanned crawler dump truck (approx. 4,000 m^2)

May 6th: spraying to areas including the mountain side of Shallow Draft Quay using the conventional method (approx. 5,200 m^2)

May 7th: spraying to areas including the west side of Shallow Draft Quay using the

conventional method (approx. 5,150 m^2)

May 8th: spraying to areas including the west side of Shallow Draft Quay using the conventional method (approx. 5,100 m^2)

May 9th: spraying to areas including the west side of Shallow Draft Quay, using the conventional method

May 9th: spraying to areas including nearby the solid waste storage facility, using the conventional method (approx. 5,250m^2)

May 10th, spraying to the east sides of turbine buildings of Units 1 and 2, using an um-manned crawler dump truck (approx. 6,000 m^2)

May 10th, spraying to areas including nearby Solid Waste Storing Facility, using the conventional method (approx. 5,050 m^2)

May 11th, spraying to areas including nearby Solid Waste Storing Facility, using the conventional method (approx. 5,250 m^2)

May 12th, spraying to areas including nearby Solid Waste Storing Facility, using the conventional method (approx. 5,250 m^2)

May 13th, spraying to the area on the north and east sides of the turbine building of Units 1, using an unmanned crawler dump truck (approx. 6,000 m^2)

May 13th, spraying to areas including nearby Solid Waste Storing Facility, using the conventional method. (approx. 5,250 m^2)

May 14th, spraying to the area on the east sides of the turbine building of Units 2, using an unmanned crawler dump truck (approx. 7,000 m^2)

May 14th, spraying to areas including nearby Solid Waste Storing Facility, using the conventional method.

May 15th, spraying dust inhibitor to areas including nearby Solid Waste Storing Facility in a conventional method, approx 7,000 m^2

May 16th, spraying to the area on the east sides of the turbine building of Unit 1, using an unmanned crawler dump truck (approx. 3,000 m^2)

May 16th, spraying dust inhibitor to areas including nearby Solid Waste Storing Facility using the conventional method, approx. 6,520 m^2

May 17th, spraying dust inhibitor to areas including nearby partner companies' yard using the conventional method, approx. 6,520 m^2

May 18th, spraying dust inhibitor to areas including nearby partner companies' yard using the conventional method, approx. 8,750 m^2

May 19th, spraying dust inhibitor to areas including nearby partner companies' yard using the conventional method, approx. 8,750 m^2

May 20th, spraying dust inhibitor to areas including nearby Incombustibles Treatment Facility, approx. 8,250 m^2

May 23rd, spraying dust inhibitor to areas including nearby Incombustibles Treatment Facility using the conventional method, approx. 8,750 m^2

May 24th, spraying dust inhibitor to east side of the turbine buildings of Units 2 and 3 using an um-manned crawler dump truck, approx. 6,000 m^2

May 24th, spraying dust inhibitor to areas including nearby Incombustibles Treatment Facility using the conventional method, approx. 8,750 m^2

May 25th, spraying dust inhibitor to areas including nearby Incombustibles Treatment Facility using the conventional method, approx. 8,750 m^2.

May 26th, spraying dust inhibitor to areas including the north side of Unit 1's reactor building using unmanned crawler dump, approx. 6,000 m^2.

May 26th, spraying dust inhibitor to areas including areas surrounding Incombustibles Treatment Facility using the conventional method approx. 7,875 m^2.

May 27th, spraying dust inhibitor to the roof and the wall of Unit 1's turbine building using a bending spray tower vehicle. , approx. 6,600 m^2.

May 27th, spraying dust inhibitor to areas including areas surrounding Incombustibles Treatment Facility using the conventional method. approx. 8,750 m^2.

May 28th, spraying dust inhibitor to areas <u>including areas surrounding Solid Waste Storing Facility</u> using the conventional method<u>, approx 4.375m^2.</u>

<u><Common spent fuel pool></u>

- 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.

<Analysis of water in the common spent fuel pool>

- On May 13th, in order to confirm the status of the common spent fuel pool, we sampled approx 1,000 ml of water. On May 14th, as a result of the nuclide analysis of the sampled water, we detected Cesium 134 and Cesium 137. We are planning to conduct the detailed evaluation from now on.

<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.
- On April 27th, with regards to the effective radiation doze of 3 months period starting from January 1st of this year for a female employee, who have been in charge for the work after the Tohoku-Chihou Taiheiyou-oki Earthquake, was 17.55 mSvh which is in excess of statutory limit of 5mSv/3months for female. After the medical examination by a doctor it was confirmed that it does not have effect to the health. On May 1st, we have confirmed that the effective exposure dose from January 1st, 2011 to March (the 4th quarter of the 2010 fiscal year) of another female employee who has also been in the restoration work after the Tohoku-Chihou-Taiheiyou-Oki Earthquake is 7.49 mSv, which is in excess of statutory dose limits (5 mSv / 3 months). The employee took medical examination on May 2nd, and the result confirmed that there is no effect on the employee's health.
- At around 11:00 am on May 5th, a worker fell from the stepladder and got injured when assembling a temporary rest station at the parking area outside the west gate of the power station. The worker was taken to the Fukushima Rosai Hospital by ambulance. There was no contamination to the body.
- At about 6:50 AM on May14th, a worker of a sub-contractor became a bad health during a carrying work for drainage treatment system in the Centralized Environment Facility. He was carried to a doctor's room of the power station at 7:03 AM and had medical treatment. Since he had lost his consciousness and stopped self breathing, at 7:35 AM he was carried to a doctor in the J Village and the doctor examined his condition. After that, at 8:35 AM, he was carried to Sogo Iwaki Kyoritsu Hospital. Radioactive substances were not attached to the worker. At 2:10 pm, on May 15th, we received notification that at 9:33 am, on May 14th, the worker was confirmed dead by the doctor.

- At approximately 10:20 am on May 23rd, a partner company's worker who was unloading a tank for the treatment water at the carry-in gate for large stuff, the 1st floor of On-site Bunker Building, had his left hand injured. After having diagnoses at the medical room of Fukushima Daiichi Nuclear Power Station and at J village, he was transferred to Iwaki Kyouritsu Hospital by an ambulance. No contamination to his body was confirmed.

<Others>

- Video recording of Units 1 to 4 reactor buildings and its surrounding area from the air by using an unmanned helicopter:
- From 3:59pm to 4:28pm on April 10th / From 10:17am to 12:25pm on April 14th
  From 8:02am to 9:55am on April 15th / From 11:43am to 12:50pm on April 21st
- 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.
- From 11:35 am to 1:24 pm on April 26th, we have checked the status inside the reactor building of Unit 1 using remotely-controlled robot. As a result, we have confirmed that the radiation dose there has not changed so much since the previous check, and that there was little water leakage from the primary containment vessel.
- From 11:36 am to 2:05 pm on April 29, we have checked the status inside the reactor building of Unit 1 using remotely-controlled robot and confirmed that there was no significant water leakage from the primary containment vessel.
- From May 10, in order to install an alternative cooling facility of Unit 3, removal of piles of rubble around carry-in gate for large stuff of nuclear building by robots and unmanned heavy equipments were conducted.
- From 4:01 am to 5:39 pm, May 13th, we confirmed the plant conditions inside of Unit 1's reactor building using the remote-controlled robot.
- April 5th approx. 3:00 pm, "Mega Float" left from Shimizu port and arriverd Yokohama port. Manufacturer of "Mega Float" finished ispection and remodeling work. At 5:20am on May 15th, "Mega Float" left from Yokohama port to Onahama port. At around 8:00 am on May 17th, it arrived at Onahama port. At 6:20 pm on May 20th, it left for Fukushima Daiichi Nuclear Power Station. At 9:35 am on May 21st, it arrived at the shallow draft quay in Fukushima Daiichi Nuclear Power Station.

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 12:15pm, 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 5μSv/h afterwards. Site will be under continuous surveillance.
- At approximately 10:01 am on May 27th, a fire broke out at the distribution panel for lighting at power supply room for High Pressure Core Spray System on the 1st basement floor of Unit 1's reactor building annex. At 10:04 am on the same day,

workers of partner company extinguished the fire, and TEPCO's employee confirmed the fire had been extinguished. We report the incident to the fire station at 10:08 am on the same day. At 11:19 am on the same day, the fire station staff confirmed at the site that the fire had been extinguished. This incident has been judged as a small fire of building.

【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