Records after August 1, 2011

※ As of 10:00 am on January 15, 2012

Fukushima Daiichi Nuclear Power Station

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

[Year 2011]

- 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."
- At 12:09 pm on August 4, we stopped the operation of diesel generator (5B) manually due to automatic start of the generator caused by an error signal related to the rector water level during the connect test of power supply associated with enhancement of instrument power. For reference, this event did not affect the power system.
- At approx. 12:50 pm on August 4, electricity went out at Main Anti-Earthquake Building. At around 12:51 pm on the same day, its power supply was restored due to start-up of emergency gas turbine generator. The cause of this power outage is currently under investigation. For reference, this event did not affect the plant status and we continue injecting water and nitrogen gas to the reactor.
- At approx. 3:00 pm on August 11, we confirmed that the circuit breaker supplying power to the charger for control power of the temporary power board for Units 1 and 2 was open. At 4:00 pm on the same day, we confirmed that the voltage of the back-up battery for control power dropped. At 1:21 am on August 12, we replaced the battery and the charger and resumed receiving power.
- At approx. 3:22 am on August, 12, an M 6.0 earthquake with the seismic center at offshore of Fukushima prefecture occurred. Events confirmed are as follows:
  - ・ The boiler for the evaporative concentration apparatus at the water treatment facility stopped. At 3:42 am on the same day, we restarted the boiler and resumed vaporization and condensation.
  - ・ At 3:52 am on the same day, we confirmed that the reactor water injection rate for Unit 1 dropped to 3.2m^3/h. At 3:52 am on the same day, we adjusted the rate to 3.9m^3/h. Reactor water injection for Units 1 to 3 is continuing.
  - ・ At 5:06 am on the same day, we confirmed that one out of two of the temporary control air compressor, Unit 1 stopped. As we could not restart this, at 6:44 am on the same day, we started the back-up diesel-driven air compressor. There is no impact on the nitrogen gas injection for Unit 1.
  - ・ At 5:27 am on the same day, we found very small volume of water leakage from a hose, primary system, alternative Spent Fuel Pool cooling system located in the radioactive waste treatment building, Unit 4. We are planning to replace the hose.
- At approx. 2:46 pm on August 19, an M6.8 earthquake with the seismic center at offshore of Fukushima prefecture occurred. Events confirmed are as follows:
  - ・ There were no abnormalities on the major parameter for each unit.
  - ・ There were no abnormalities on the outside power supply, water injection into reactors, Nitrogen injection into the reactors and cooling water of the spent fuel pools.
- At approx. 11:30 am on August 25, we found that oil piping for cooling main transformer is damaged and blowing out of contained insulation oil, during the removal work of debris near main transformer of unit 3. At 6:10 pm on the same day, we confirmed the oil leakage from the oil pipeline stopped
- At around 3:00 pm on October 3, TEPCO staff observed an oil leakage from the transformer B system for transportation of Okuma 3 line (in-vehicle) while on patrol. The amount of the oil leakage was about one drop in ten seconds and the oil formed an oil film of approximately 1m x 1m. An emergency procedure was taken to stop the leakage. A further investigation will be conducted, though the transformer can be used without problems.
- Water treatment facilities suspended at 6:30 on November 25 to switch the power source of Oukuma 2 line movable transformer. Cesium adoption apparatus resumed after switching power source to Oukuma 3 line at 12:37pm. (1st Cesium

adoption apparatus at 15:00, 2nd Cesium adoption apparatus at 17:00)

On December 2, as we finished the construction work to reinforce on-site power, we stopped the evaporative concentration apparatus (reverse osmosis membrane type) at 6:00pm on December 6 and the cesium adsorption apparatus at 8:04am on December 3, respectively, in order to start receiving power from the power source. As for the second cesium adsorption apparatus, it is operated without interruption and the treatment of accumulated water is in progress. There is no adverse effect to water injection into the reactor, as purified water in the buffer tank is utilized. We restarted the water desalinations (reverse osmosis membrane type) at 1:30 pm on December 3 and the cesium adsorption apparatus at 2:22 pm, and the evaporative concentration apparatus at 2:34 pm, after power receiving operation.

- For works to stop of the leakage detected between cable duct for starting transformer and control building of Unit 3, which was confirmed on August 4 (announced on August 8, 2011), we conducted switching power of power panel from at 7:07 pm to 9:01 pm on December 3, to transfer and disconnect cables of power panel of backup transformer, receiving power from Okuma line 2L. Due to the switching work, lightings of rest houses in the site, regional air-exhaust ventilators, dust monitors located at main entrance, Main Anti-Earthquake Building, and rest houses of Unit 5/6 service building were stopped. After finishing switching works, the abovementioned systems recovered

- At around 2 pm on October 23, TEPCO's employee found seemingly oil spill outside the oil retaining wall of temporary oil tank for main transformer in the power plant premise (Wild Bird Forest). At around 2 pm on October 24, we confirmed at the site that there were oil film in the water accumulated in the oil retaining wall and the oil was accumulated in the space which the water in the oil retaining wall spilled. From these reasons, we assumed that the oil observed on October 23 was the oil which spilled from the oil retaining wall by inflow of rain water to the wall. At this moment, we are investigating in detail, including nuclide analysis for the water accumulated in the wall and analysis on the oil film.
- On 9:30 am on November 15, at the emergency feed water injection lines of Units 1 to 3, in preparation for the installation of flow control valves to increase the water flow controllability, in order to secure a place to install, we started transfer of a truck on which to load an emergency diesel generator located upland for feed water injection. On 10:37 am on the same day, the transfer of track finished. In line with the transfer we disconnected and then reconnected the power line. Although the diesel generator became unready due to the transfer of track, there is no effect caused by the installation work because we continue water injection into the reactor with the regular-use feed water pump located upland.
- At 9:10 am on December 16, a cooperative firm worker discovered the burnt trace in the distribution panel at Centralized Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]). But a smoke was not found. We reported the incident to the fire station at 9:19 am on the same day. At 10:28, we stopped power supply to the distribution panel. Afterwards, as the result of confirmation at the site of this facility by fire station, it is considered that the fire was not occurred. At 2:30 pm, we resumed power supply to the distribution panel.

[Year 2012]

【Unit 1】

<Water injection to the reactor>

[Year 2011]

- From 5:55 pm to 5:56 pm on August 1, we changed the volume of water injected into the reactor to approx. 3.9m^3/h.
- At 9:02 am on August 5, decrease of water injection volume to the reactor was confirmed and it was adjusted to approx. 3.9 m^3/h.
- At 8:32 am on August 10, we adjusted flow rate of injecting water at approx. 3.8m^3/h due to the decrease of injected water to reactors
- At 12:20 pm on August 10, we adjusted flow rate of injecting water at approx. 3.8m^3/h due to the increase of injected water in reactor.
- At approx. 3:22 am on August 12, an M 6.0 earthquake with the seismic center at offshore of Fukushima prefecture occurred. At 3:52 am on the same day, we

confirmed that the reactor water injection rate for Unit 1 dropped to 3.2m^3/h. At 3:52 am on the same day, we adjusted the rate to 3.9m^3/h.

- At 7:36 pm on August 13, we adjusted the rate of water injection to the reactor to approximately 3.8m^3/h as we confirmed decrease in the amount of water injection.
- At 3:20 pm on September 1, as it was confirmed that there was a decrease in the amount of water injection for the reactor of Unit 1, we adjusted the rate to approx. 3.8m^3/h.
- At 9:40 am on September 3, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 2:53 pm on September 7, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 5:40 pm on September 11, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 6:07 pm on September 13, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 3:41 pm on September 16, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 11:40 am on September 21, as it was confirmed that there was a decrease in the amount of water injection to the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 10:25 am on September 28, we switched water injection line to emergency line at Units 1,2 and 3 for the trial run of mini flow line in the regular injection line set on the hill. At 2:02 pm on the same day, we switched back to the regular water injection line after the trial run. There was no change in the injection amount due to this work
- At 9:28 am on October 6, we arranged the amount of water injected to the reactor to 3.8m^3/h since we found the reduction in the amount of injected water.
- At 2:22 pm on October 25, since we observed reduction of water injection volume to the reactor, we adjusted the injection volume at approx. 3.8m^3/h.
- At 6:10 pm on October 25, we adjusted the rate of water injection to reactor from approximately 3.0 m^3/h to approximately 3.8m^3/h following the alert that showed decrease of water injection at 5:48 pm on the same day.
- At 9:47 am on October 26, for the water injection to the reactor, we switched from normal water injection line to emergency water injection line, due to the shutoff of facilities for power source reinforcement work. Along with the switching work, we adjusted the amount of water injection from water feeding system to approximately 3.8m^3/h. At 4:10 pm on the same day, we switched from emergency water injection line to normal water injection line due to completion of power source reinforcement work and confirmed the injection amount was stable.
- At 9:30 am on October 28, due to the additional installment of control valve of Unit 1 water injection line to improve controllability of water injection, we switched water injection line into the reactor of Unit 1 and Unit 2 from normal line to emergency line. As the installment work was finished, at 1:30 pm on the same day, we switched water injection line from emergency line to normal line. At 2:00 pm on the same day, accompanied by the switching of injection line, we adjusted water injection rate from feed water system approx. 3.9m^3/h for Unit 1.
- At 4:10 pm on October 28, we adjusted the amount of water injected to the reactor of Unit 1 to approx. 4.5m^3/h in order to improve the working condition inside the covers at Unit 1 by holding down the evaporation from the reactor.
- At 3:30 pm on October 29, we adjusted the amount of water injected to the reactor of Unit 1 to approx. 5.5m^3/h in order to improve the working condition inside the covers at Unit 1 by holding down the evaporation from the reactor.
- At 3:05 pm on October 30, we adjusted the amount of water injection to the reactor of Unit 1 to approximately 6.5m^3/h in order to improve the working environment inside the covering, making it sure to mitigate the steam emission at the reactor building of Unit 1.

- At 2:59 pm on October 31, we adjusted the amount of water injection to the reactor of Unit 1 to approximately 7.5m^3/h in order to improve the working environment inside the covering, making it sure to mitigate the steam emission at the reactor building of Unit 1.
- The injecting water line changed for injecting boric acid water was replaced. At 4:14pm on November 2, we adjusted injecting water volume into the reactor Unit 1 at approx. 7.5m^3/h from reactor feed water system.
- On November 4, due to inspection of Unit 3 reactor water injection pump, it was switched to Unit 1/2 reactor water injection pump. At 3:13 pm, together with this switch, in regard with water injection to Unit 1 reactor, water injection amount of feed water system was adjusted to approx.7.6 m^3/h.
- At 9:15 am on November 17, at unit 1 emergency reactor injection line, the additional installation work for water flow adjusting valve was commenced to better control the amount of water injection, and completed at 1:09 pm on the same day. Water injection to reactor had been done through regular reactor water injection line, and therefore the additional installation work above had no impact to water injection.
- At 3:33 pm on November 18, we adjusted flow rate of injecting water of reactor of Unit 1 at approx. 5.5m^3/h before the addition of water injection line from Core Spray System in order to enhance security of water injection.
- At 1:58 pm on November 20, as it was confirmed that there was a decrease in the water injection amount from the feed water system, injection amount was adjusted from 5.3m^3/h to 5.5m^3/h.
- On October 28, after regular operation of the gas control system for PCV, Unit 2, since a relatively high density hydrogen was detected on October 29, we are intending to control the hydrogen density below the inflammable limit (4%) even if there is no steam, by directly including nitrogen into the RPV for Units 1 to 3.

  Until we have included nitrogen into RPV, in order to lower the hydrogen density of RPV by increasing the temperature and the steam ratio thereby, on November 24, we lowered the amount of water injection into the reactor of Units 1 to 3. After that, we monitored the temperature trend in the RPV and the PCV. Since the change of the temperature was small and there was a possibility of significant change of the temperature by further reduce of the water injection, we adjusted it from approx. 5.0 m^3/h to approx. 4.5 m^3/h through reactor feed water system from 10:18 am to 11:02 am on November 26. As we assumed that the hydrogen density of RPV was decreased from the result of the operation, at 10:09 am on December 10, we started water injection from the core spray system addition to the water feeding system to cool down the reactors more stably. At 10:11 am on the same day, we adjusted the water injection volume of the core spray system to approx 1.0m^3/h. (The current water injection volume is approx 4.2m^3/h from the water feeding system.)

- On November 29, since we observed decrease in water injection into the reactor, we adjusted the water injection amount 4.2m^3/h to 4.5m^3/h from feed water system from 10:13 am to 10:28 am.
- At 10:35 am on December 2, we adjusted water injection volume from approx. 4.0m^3/h to approx. 4.5m^3/h since decrease in injection volume was observed.

  At 5:47 pm on 5 December, Amount of water injected through feed water system was adjusted from approx. 4.0 m^3/h to 4.5 m^3/h as the decrease of such amount was observed.
- At 10:13 am on December 9, as we observed reduction of the water injection rate, adjusted the rate from the feed water system from approx 4.2m^3/h to approx 4.5m^3/h.
- At 10:30 am on December 11th, we adjusted water injection from Core Spray System from approx. 1.0 m^3/h to approx. 2.0m^3/h to cool down the reactor more safely. (Water injection from the Feed Water System continued with the level of approx. 4.2m^3/h).
- At 9:40 am on December 16, as the decreasing of injecting water was confirmed, we adjusted injection rate of core spray system from approx.1.6m3/hour to approx.2m3 /hour. (the injection of feed water system is continuing at 4.5 m^3/h)
- At 5:05 am of December 21, decrease in water injection was confirmed and we

adjusted water injection from the reactor feed water system from approx 4.3 m^3/h to 4.5 m^3/h, and water injection from the core spray system from approx. 1.8 m^3/h to 2.0 m^3/h.

- On 10:30 am on December 23, the change of injection water flow to Reactor was found so that water injection from Core Spray System was adjusted from approx. 1.9 m^3/h to 2.0 m^3/h (water injection from feed water system was remained unchanged as approx. 4.5 m^3/h).
- At 9: 44 am on December 30, the injected water amount was adjusted from approx. 4.4 m3/h to approx.4.5 m3/h in feed water system, from approx. 1.8m^3/h to approx.2.0m^3/h in corer spray system as the change in the injected water amount was observed.

[Year 2012]

- As it was confirmed that there was fluctuation in the amount of water injection for the reactor at 10:57 am on January 1, 2012, we adjusted the rate of water injection from piping of core spray system from 1.8 m^3/h to approx. 2.0 m^3/h. (Water injection is continuously implemented at the rate of 4.5 m^3/h from water feeding system)
- At 10:12 am on January 5 2012, there was a fluctuation in the injection amount to the reactor of Unit 1. Therefore we adjusted the injection through the reactor feed water system from 4.8m^3/h to 4.5m^3/h and injection through the reactor spray system from 1.8m^3/h to 2.0m^3/h.
- At 11:07 am on January 12, 2012, we adjusted the amount of the water injection from approx. 4.6 m^3/h to approx. 4.5 m^3/h (the reactor feed water system), from approx. 1.6 m^3/h to approx. 2 m^3/h (the core spray system) since we confirmed fluctuation of the amount of the water injection into the reactor.

<Water injection to Spent Fuel Pool>

[Year 2011]

- At 3:20 pm on August 5, we started freshwater injection into the Spent Fuel Pool of Unit 1 through Spent Fuel Pool Cooling and Filtering System, and finished at 5:51 pm.
- At 8:59 am on August 10, we started freshwater injection into the Spent Fuel Pool using Fuel Pool Cooling and Filtering System, and finished at 9:19 am on same day.

[Year 2012]

<Treatment of the Accumulated Water>

[Year 2011]

- At 9:53 am on September 14, we stared transfer of the accumulated water from the condenser of Unit 1 to the basement of Turbine Building of Unit 1. At 2:35 pm on September 16, we stopped transfer.
- At 10:35 am on October 22, we started transfer of the accumulated water from the basement of Turbine Building of Unit 1 to the basement of Turbine Building of Unit 2. At 9:07 am on October 24, we stopped transfer.
- At 5:31 pm on October 25, we started transfer of the accumulated water from the basement of Turbine Building of Unit 1 to the basement of Turbine Building of Unit 2. At 2:01 pm on October 26, we stopped transfer.
- At 3:48 pm on November 4, we started transfer of the accumulated water from the basement of Turbine Building of Unit 1 to the basement of Turbine Building of Unit 2. At 9:41 am on November 6, we stopped transferring.
- From 3:42 pm on November 11, we started transferring accumulated water from the basement of Unit 1 turbine building to the basement of Unit 2 turbine building. At 10:45 am on November 13, we stopped transferring.
- At 2:54 pm on November 25, we started transferring accumulated water from Unit 1 T/B to Unit 2 T/B. At 9:38 am on November 27, we stopped transferring it.
- At 2:00 pm on December 10, we started transferring of accumulated water from underground of the Turbine Building of Unit 1 to underground of the Turbine Building of Unit 2. At 9:22 am on December 12, we stopped the transfer.
- At 4:07 pm on December 23, we started transferring accumulated water from the basement of turbine building of Unit 1 to the basement of turbine building of Unit 2. At 9:38 am on December 25, we stopped transferring.

[Year 2012]

<Alternative Cooling of Spent Fuel Pool>

[Year 2011]

- From 10:06 am to 11:15 am on August 10, we started commissioning the alternative cooling system of the Pool's cooling and filtering system. And at 11:22 on same day, we started full-scale operation.
- At 5:43 am on November 9, cooling system of spent fuel pool was stopped due to the switching work of electricity to enhance security of electricity source. (The temperature at 5:43 am was 22℃.) The cooling system of spent fuel pool was restarted 10:29 pm. (The temperature of the spent fuel pools were 20℃when the instruments were restarted.) The temperature of the spent fuel pool of Unit 1 became lower. This was presumed to be influenced by water in Skimmer Surge Tank whose temperature was lowered by open air.
- To switch the power source for the purpose of improving the reliability of power, we suspended the alternative cooling of the spent fuel pool of Unit 1 at 10:20 pm on December 11 (SFP water temperature at the time of suspension was 14 °C). At 5:07 pm on December 12, Unit 1 SFP alternative cooling system was resumed (SFP water temperature at the time of resume was 15 °C).
- At 10:23 on December 17, in the spent fuel pool alternative cooling system, an alarm for "Air fin cooler panel malfunction" was triggered. After the investigation at the site, it was confirmed that the secondary system pressure decreased and the circulating pump (A) was shutdown automatically. After the detailed investigation, it was confirmed that the water leaked through the drainage line in the safety valve installed in the upside of the pump (A). As the position of the handle of the valve was off the usual position, we fixed it and at around 11:00 the leaking stopped. After that, we increased the system pressure. Confirming that no water leaked through the system, at 13:39, we restarted the circulating pump (A) and cooling the spent fuel pool. The leaked water from the drainage line is for the fire extinction purpose (filtered water) and does not contain radioactive materials. The temperature of the spent fuel at the cold shutdown and restart is 13℃ and no there is no temperature rising.
- At 11:11 am on December 19, we found water drops on a few drops per second from connection point of the valve and piping of pressure indicating instrument of secondary coolant system of the spent fuel pool alternative cooling system of Unit 1. At 11:55 am on the same day, we tightened the connection point and then water drops stopped. The dropped water was filtrate water (fresh water) and no radioactive material was contained. Also, spent fuel pool alternative cooling system was in operation continuously and there is no problem on cooling.

[Year 2012]

< Injection of nitrogen gas into Primary Containment Vessel >

[Year 2011]

- From 5:52 am on August 2, in order to replace the nitrogen gas injector device, we stopped nitrogen gas injection into the Primary Containment Vessels of Units 1 to 3. After completion of the replacement, we restarted injection of nitrogen gas at 8:33 am.
- In order to construct the nitrogen injection line direct to the reactor branched by the nitrogen injection line into the primary containment vessel, at 9:55 am on November 29, we temporarily stopped Nitrogen injection into the primary containment vessel. Then, we restarted Nitrogen injection into the primary containment vessel. At 11:30 am on the same date, we confirmed the nitrogen injection amount (28m^3/h) into the primary containment vessel was stable.
- In order to construct the nitrogen injection line direct to the reactor branched by the nitrogen injection line into the primary containment vessel of Unit 1. Then, we restarted Nitrogen injection into the primary containment vessel of Unit 1. At 12:23 pm on the same day, we confirmed the nitrogen injection amount (28m^3/h) into the primary containment vessel was stable. At 4:04 pm on November 30, we started operation to inject nitrogen into the reactor pressure vessel. At 4:08 pm, injection amount reached the scheduled amount of 5 m^3/h.
- At 10:44 am on 5 December we started increasing nitrogen injection to the reactor ,

from which we started on 30 November from approx. 5m3/h to 10m3/h, due to stabilized parameters of the facilities of the power plants such as the Reactor Pressure Vessel and the Primary Containment Vessel.

- At 1:15 pm on December 7, we adjusted the nitrogen injection rate to RPV of Unit 1 from 10m3/h to 15m3/h so that we can have some margin to the flammability limit of hydrogen in RPV even if the nitrogen injection facility is stopped.
- At 10:55 on December 7, to improve the reliability of nitrogen injection, we started installing a flow meter and a pressure meter to the nitrogen injection line of Unit 1. At 11:26 on the same day, we completed the installment. We suspended the nitrogen injection due to this work, however, there is no problem since the suspended period is short.
- When we cut the power of the PCV gas control system (Line A: under suspension) of Unit 1 to switch the power source for the improvement work of the on-site power source at approx. 10:38 am on December 12, the monitoring system in the main anti-earthquake building for the same system (Line B: under commissioning) was stopped. At approx. 11:30 am, we confirmed on site that the system (Line B) was stopped. Later, it was revealed that the power for controlling Line B comes from Line A, therefore we switched the power for the control, then at 12:00 pm we resumed Line B. Since Line B is normally operating after the re-start, we estimate that the reason Line B went down is that the power for Line A was cut.
- Since the monitoring results of the decontamination of radioactivity material and hydrogen density at the Primary Containment Vessel (PCV) gas controlling system which was in a test run was stable, we started regular operation of this system at 6:00 pm of December 19.
- On December 20, according to the operational record thus far, we changed the volume of nitrogen included into PCV and that of gas emitted from PCV gas control system. At 11:00 am on the same day, we decreased the reactor nitrogen amount from 28Nm3/h to 18Nm3/h, and at 11:30 am, we increased the gas emission amount from 15Nm3/h to 30Nm3/h,
- On December 22, according to the operational record thus far of Unit 1, we changed the volume of nitrogen into PCV and that of gas emitted from PCV gas control system. At 10:35 am on the same day, we decreased the nitrogen injection amount from approx. 18Nm3/h to approx. 13Nm3/h. In addition, at 11:45 am, we confirmed the volume of gas emitted from the gas management system decreased from approx. 30Nm3/h to 26.9Nm3/h.
- On December 26, as to the injection of nitrogen into the Primary Containment Vessel of Unit 1 and gas emission from gas management system of for the Primary Containment Vessel, considering the operating track record, we changed the volume of nitrogen injection and the emission amount from the gas management system. At 1:22 pm on the same day, we adjusted the volume of nitrogen injection into the Primary Containment Vessel from approx. 13m^3 / h to approx. 8m^3 / h. At 1:43 pm on the same day, we adjusted the emission amount from the gas management system from approx. 28m^3 / h to approx. 23m^3 / h.

[Year 2012]

<Others>

[Year 2011]

- At 3:22 am on August 12, an M 6.0 earthquake with the seismic center at offshore of Fukushima prefecture occurred. We confirmed that one out of two of the temporary control air compressor stopped. As we could not restart this, at 6:44 am on the same day, we started the back-up diesel-driven air compressor.
- From 8:10 am to 2:25 pm on August 28, we conducted dust sampling at the upper part of Unit 1 reactor building using a large crane vehicle.
- From 9:45 am to 1:30 pm on September 11, we conducted dust sampling at the upper part of reactor building of Unit 1 using a large crane vehicle.
- From 9:15 am to 12:10 pm on September 14, we sampled gases in the Reactor Pressure Vessel of Reactor Building, Unit 1.
- From 8:55 am to 12:05 pm on October 3, we conducted dust sampling at the upper parts of Unit 1 reactor building using a large-scale crane.
- From 11:44 am to 2:03 pm on October 7, we conducted dust sampling at Opening

section for equipment hatch and truck bay door of Unit 1 Reactor building.

- At 5:07 pm, to install a gas controlling system of RPV, Unit 1, we started cutting a pipe in the RPV spray after we confirmed the hydrogen density was low enough. At 10:30 pm on the same day, the cutting finished.
- From 2:17 pm to 3:17 pm on October 12, we conducted dust sampling at Opening section for equipment hatch and truck bay door of Unit 1 Reactor building.
- From 11:31 am to 0:31 pm on October 25, we conducted dust sampling at the opening for the equipment hatch in the reactor building of Unit 1.
- At 1:17 pm on October 26, we started cutting off the designated piping after confirming that the hydrogen density inside the piping for cooling in case of reactor shutdown was less than 0.1 %, as one of the construction work to install gas monitoring system inside the Primary Containment Vessel. At 3:15 pm on the same day, we finished cutting pipes. After that, we conducted welding of blind plates of cut pipes and covering holes of the pipes. At 7:00 pm on the same day, we finished all operations.
- On October 28, we completed the installation of cover panels which cover the reactor building of Unit 1 to control emission of radioactive materials.
- From 1:35 pm to 2:35 pm on November 4, we conducted dust sampling at the opening for the equipment hatch in the reactor building and truck bay door of Unit 1.
- From 10:10 am to 12 pm on December 2, we conducted dust sampling at the ventilation equipment filter of Unit 1 reactor building cover.
- From 1 pm to 2 pm on December 2, we conducted dust sampling and measured air flow at the upper part of the reactor building equipment hatch of Unit 1.
- On December 7, as a part of installation work of the Primary Containment Vessel Gas Management System in the Unit 1 reactor building, we conducted nitrogen substitution in order to eliminate hydrogen in the existing pipe arrangement to be used in the system.
- Since December 22, the atmospheric temperatures at point C of Unit 1 Primary Containment Vessel (PCV) monitored by the Containment Atmospheric Monitoring System had risen (the atmospheric temperature of the PCV on December 22 was approx. 38℃, at 7 pm on December 27 was approx. 49℃). The other temperatures had not risen, so we conducted a survey from 9 am to 10 am on December 28, and we confirmed that there are no problems. From 11:00am to 12:15pm on the same date, to identify cause with monitoring, we adjusted the volume of Nitrogen injection, from approx. 8 m^3/h to approx.18 m^3/h, and emission of the gas management system, from approx. 23 m^3/h to approx.30 m^3/h, as of before December 22. The temperature, the maximum went up to approx. 54.6℃ at 6 pm on December 28, fell to approx. 52.3℃ at 10 am and 1 pm on December 29. Temperatures at other two points also indicated slight increases but are currently in the stable status. (Temperature at 1:00 pm on December 29: point D: approx. 34.8℃, point E: approx. 39.2℃)

  We estimated that the cause of rise in temperature is change the volume of nitrogen included into PCV and exhausted from PCV. We will continuously conduct the survey for the cause of temperature increase and surveillance of the plant.

  Temperatures on the following time are shown as follows.

  (Maximum temperature since December 22)

  Point C: Approx. 54.6℃ at 6:00 pm on December 28

  Point D: Approx. 35.8℃ at 5:00 pm on December 29

  Point E: Approx. 40.0℃ at 5:00 pm on December 29

  At 11:00 am on December 31: Point C approx. 45.9℃, Point D approx. 33.4℃, Point E approx. 36.9℃

  [Year 2012]

  At 5:00 am on January 1, 2012: Point C approx. 44.7℃, Point D approx. 32.9℃, Point E approx. 36.2℃

  At 11:00 am on January 1, 2012: Point C approx. 44.4℃, Point D approx. 32.9℃, Point E approx. 36.3℃

  At 11:00 am on January 3, 2012: Point C approx. 42.8℃, Point D approx. 32.4℃, Point E approx. 35.5℃

  At 5:00 am on January 4, 2012: Point C approx. 42.4℃, Point D approx. 32.2℃, Point E approx. 35.2℃

  At 11:00 am on January 4, 2012: Point C approx. 42.3℃, Point D approx. 32.1℃, Point E approx. 35.1℃

  At 5:00 am on January 5, 2012: Point C approx. 41.6℃, Point D approx. 31.4℃,

Point E approx. 34.4℃
At 11:00 am on January 5, 2012: Point C approx. 41.4℃, Point D approx. 31.3℃, Point E approx. 34.3℃
At 5:00 am on January 6, 2012: Point C approx. 42.0℃, Point D approx. 31.5℃, Point E approx. 34.5℃

- On January 3, 2012, we conducted dust sampling at the upper part of Unit 1 reactor building at emission filter of Unit 1 reactor building cover.
- On January 4 2012, we conducted sampling of the gas of the PCV gas management system. As a result of the analysis, we confirmed that at the entrance of the system Xenon 135 was below detection limit (1.1×10^{-1}Bq/cm^3), and below the re-criticality criterion which is 1Bq/cc.
- Around 1:40 pm on January 14, extremely small amount of water leakage was found from 2 pinholes of the hose in water transfer line between the vertical shaft in Unit 1 to the centralized radiation waste treatment facility while water passing test was being conducted. The leakage stopped after suspending the pump. The result of sampling indicated Iodine 131 was below measurable limit, Cesium 134 was 1.8×10^{1}Bq/cm^3 and Cesium 137 was 2.0×10^{1}Bq/cm^3, We estimate that it is mixture of sea water and rain water. The pinholes were closed by plastic. <u>The water leakage point is the outdoor laying part at flushing line that transfer the accumulated water of the vertical shaft in Unit 1 to the accumulated water transfer line in Unit 2. The amount of water leakage is estimated to be less than approximately 1 liter.</u>

【Unit 2】

<Water injection to the reactor>

[Year 2011]

- From 5:55 pm to 5:56 on August 1, we changed the rate of water injection into the reactor to approx. 3.9m^3/h.
- At 5:50 pm on August 4, decrease in the rate off water injection into Unit 2 reactor was confirmed and it was adjusted to approx. 3.8m^3/h.
- At 8:32 am on August 10, we adjusted flow rate of injecting water at approx. 3.8m^3/h due to the decrease in the rate of water injection to reactor.
- At 12:20 pm on August 10, we adjusted the rate of injecting water at approx. 3.8m^3/h due to the increase in the rate of injecting water to reactor.
- At 7:30 pm on August 12, we adjusted the rate of injecting water at approx. 3.8m^3/h, as we confirmed the increase in the rate of injecting water to reactor.
- At 9:48 pm on August 15, we adjusted the rate of injecting water at approx. 3.8m^3/h as we confirmed the decrease in the rate of injecting water to reactor.
- At 3:46 pm on August 17, we adjusted the rate of injecting water to the reactor at approx. 3.8m^3/h, as we confirmed the decrease in the rate of water injection.
- At 3:30 pm on August 19, we adjusted the rate of injecting water to the reactor at approx. 3.8m^3/h, as we confirmed decrease in it.
- At 6:56 pm on August 30, we adjusted the rate of injecting water to the reactor at approx. 3.8m^3/h, as we confirmed decrease in it.
- At 7:17 am on September 2, as it was confirmed that there was a decrease in the amount of water injection for the reactor of Unit 2, we adjusted the rate to approx. 3.8 m^3/h
- At 9:40 am on September 3, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 4:27 pm on September 6, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approx. 3.8m^3/h.
- At 2:55 pm on September 7, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approximately 3.8m^3/h.
- At 10:33 pm on September 8, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approximately 3.8m^3/h.
- At 5:40 pm on September 11, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to

approximately 3.8m^3/h.

- At 6:07 pm on September 13, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approximately 3.8m^3/h.
- At 2:59 pm on September 14, we started water injection into the reactor of Unit 2 through the core spray system in addition to the injection through the reactor feed water system. At 3:25 pm on the same day, we adjusted the volume water from the core spray system to 1.0 m^3/h. The volume of water injected from the feed water system remains unchanged
- At 3:45 pm on September 15, with regard to the injection into the reactor of Unit 2, we adjusted the amount of water injection from the core spray system to approx. 2.0 m^3/h (the amount from the feeding water system is kept at approx. 3.8 m^3/h)
- At 9:11 am on September 16, as it was confirmed that there was a decrease in the amount of water injection for the reactor, we adjusted the rate of water injection to approx. 2.0m^3/h.
- At 3:35 pm on September 16, with regard to the injection into the reactor of, we adjusted the amount of water injection through the core spray system to approx. 3.0m^3/h (injection through feed water system remain at 3.8m^3/h).
- At 3:16 pm on September 19, we adjusted water injection amount from Core Spray System to the reactor of Unit 2 to approx. 4.0 m^3/h. (Water injection amount from Reactor Feed Water System remains approximately. 3.8 m^3/h.)
- At 11:40 am on September 21, as it was confirmed that water injection through reactor water feed system was decreased. We adjusted the amount of water injection to approximately at 4.0 m^3/h. The amount of water injection through reactor core spray system was also adjusted to approximately 4.0 m^3/h.
- At 3:36 pm on September 22, we adjusted the volume of water injected at 5.0 m^3/h from Core Spray System into Reactor Building (we continue injecting water at of 4.0 m^3/h from Feed Water System).
- At 3:05 pm on September 26, we adjusted the volume of water injected at 6.0 m^3/h from Core Spray System into Reactor Building of Unit 2 (while we continue injecting water at of 4.0 m^3/h from Feed Water System).
- At 10:25 am on September 28, we switched water injection line to emergency line at Unit 1,2 and 3 for the trial run of mini flow line in the regular injection line set on the hill. At 2:02 pm on the same day, we switched back to the regular water injection line after the trial run. There was no change in the injection amount due to this work.
- At 3:00 pm on October 4, we adjusted water injection rate into Unit 2 through reactor spraying system at approx. 7.0 m^3/h (injection rate through feed water system remains at approx. 4.0 m^3/h).
- At 5:38 pm on October 6, we adjusted water injection rate through reactor feed water system at 3.8 m^3/h, since we observed decrease in water injection. (Injection rate through core spray system remains at approx. 7.0 m^3/h.)
- At 6:52 pm on October 25, we adjusted water injection rate through reactor feed water system at 3.0 m^3/h, since we observed decrease in water injection. (Injection rate through core spray system remains at approx. 7.0 m^3/h.)
- -At 9:47 am on October 26, for the water injection to the reactor, we switched from normal water injection line to emergency water injection line, due to the shutoff of facilities for power source reinforcement work. Along with the switching work, we adjusted the amount of water injection to the reactor to approximately 3 m^3/h from water feeding system, and to approximately 7m^3/h from Core Spray System . At 4:10 pm on the same day, we switched from emergency water injection line to normal water injection line due to completion of power source reinforcement work.
- At 9:55 am on October 27, we switched water injection line of unit 1 and 2 from normal water injection line to emergency water injection line to add the vane to adjust flow amount of water injection line to the Unit 2's reactor in order to improve the ability to control the water injection amount. At 2:35 pm on the same day, we switched from emergency water injection line to normal water injection line due to completion of the work. Injection amount is stable after the work.
- At 9:30 am on October 28, due to the additional installment of control valve of Unit 1 water injection line to improve controllability of water injection, we switched water

injection line into the reactor of Unit 1 and Unit 2 from normal line to emergency line. As the installment work was finished, at 1:30 pm on the same day, we switched water injection line from emergency line to normal line. At 2:00 pm on the same day, accompanied by the switching of injection line, we adjusted water injection rate from feed water system approx. 3.0m^3/h and from core spraying system approx. 7.0 m^3/h for Unit 2.

- At 3:50pm on November 1, we adjusted water injection rate from feed water system approx. 3.0m^3/h and from core spraying system approx. 7.0 m^3/h for Unit 2.
- The injecting water line changed for injecting boric acid water was replaced. At 4:14pm on November 2, we adjusted injecting water volume into the reactor Unit 2 at approx. 3/0 m^3/h from reactor feed water system and at approx. 7.0 m^3/h from core spray system.
- On November 4, due to inspection of Unit 3 reactor water injection pump, it was switched to Unit 1/2 reactor water injection pump. At 3:13 pm, together with this switch, water injection amount of feed water system was adjusted to approx.3.0 m^3/h, and that of the reactor core spray system to approx.7.2 m^3/h.
- At 9:15 am on November 17, at unit 2 emergency reactor injection line, the additional installation work for water flow adjusting valve was commenced to better control the amount of water injection, and completed at 1:09 pm on the same day. Water injection to reactor had been done through regular reactor water injection line, and therefore the additional installation work above had no impact to water injection.
- At 3:33 pm on November 18, along with the adjustment of water injection amount of Unit 1, we adjusted the amount of water injection to the reactor of Unit 2 to approximately 3.1m^3/h from water feeding system, and to approximately 7.1 m^3/h from Core Spray System.

※On October 28, after regular operation of the gas control system for PCV, Unit 2, since a relatively high density hydrogen was detected on October 29, we are intending to control the hydrogen density below the inflammable limit (4%) even if there is no steam, by directly including nitrogen into the RPV for Units 1 to 3.

Until we have included nitrogen into RPV, in order to lower the hydrogen density of RPV by increasing the temperature and the steam ratio thereby, on November 24, we lowered the amount of water injection into the reactor of Units 1 to 3.

- Unit 2: At 7:11 am, the water injection amount by the reactor core system decreased from 7.2 m3/h to 5.6 m3/h. (the injection of feed water system is continuing at 2.9 m3/h)

After that, we monitored the temperature trend in the RPV and the PCV. Since the change of the temperature was small and there was a possibility of significant change of the temperature by further reduce of the water injection, we adjusted it from approx. 5.5 m^3/h to approx. 4.5 m^3/h through core spray system from 10:18 am to 11:02 am on November 26 (through reactor feed water system it remains unchanged, approx. 3.0 m^3/h). As we assumed that the hydrogen density of RPV was decreased from the result of the operation, at 11:25 am on December 10, we adjusted the water injection volume of the core spray system from approx. 4.5 m^3/h to approx 5.5m^3/h to cool down the reactors more stably (The current water injection volume is approx 2.9m^3/h from the water feeding system.)

- At 10:13 am on December 9, as we observed reduction of the water injection rate, adjusted the rate from the core spray facility from approx 4.2m3/h to approx 4.5m3/h (from feed water system remains at approx 3.0m3/h).
- At 10:44 am on December 11th, We adjusted water injection from Core Spray System from approx. 5.6 m3/h to approx. 6.0 m3/h to cool down the reactor more safely, while we adjusted water injection from the Feed Water System from approx. 2.5 m3/h to approx. 3.0 m3/h
- At 10:40 am on December 14, as the decreasing of injecting water from feed water system was confirmed, we adjusted injection rate from approx.2.5m3/hour to approx.3m3 /hour. And also adjusted injection rate of core spray system from approx. 6.2m3/hour to approx.6m3/hour.
- At 11:14 am on December 19, because we found decrease of water injection rate from water feeding system, we adjusted injection rate from approx. 1 m^3/h to approx. 3 m^3/h (water injection from core spray system with approx. 6 m^3/h was continuing).

- On 10:30 am on December 23, the change of injection water flow to Reactor was found so that water injection from feed water system was adjusted from approx. 2.5 m^3/h to 3.0 m^3/h (water injection from Core Spray system was remained unchanged as approx. 6.0 m^3/h).
- At 11 am on December 27, regarding the water injection into the reactor core of unit 2, for the purpose of preparation of commissioning of water injection pumps for diversification, water injection rate from feed water system was adjusted from approx. 2.8 m^3/h to 2.0 m^3/h, from core spraying system was adjusted from approx. 6.0 m^3/h to 7.0 m^3/h.
- At 9: 44 am on December 30, the injected water amount was adjusted from approx. 1.8 m^3/h to approx.2.0 m^3/h in feed water system (no change in corer spray system with approx. 7.0m^3/h) as the change in the injected water amount was observed.

[Year 2012]

- As it was confirmed that there was fluctuation in the amount of water injection for the reactor at 10:15 am on January 1, 2012, we adjusted the rate of water injection from water feeding system from 1.8m^3/h to approx. 2.0 m3/h. We also adjusted the rate of water injection from piping of core spray system from 7.1m^3/h to approx. 7.0 m3/h.
- At 9:36 am on January 4, 2012, we adjusted the volume of water injected into the reactor of Unit 2 through reactor spray system from approx. 7.2m^3/h to approx. 8.2m^3/h in order to decrease reactor temperature for containment monitoring.
- At 9:58 am on 5 January 2012, due to diversification works of reactor water injection pumps, we adjusted water injection through reactor feed water system from approx.1.7m^3/h to 1m^3/h, and water injection from core spray system from approx. 8.2m^3/h to 9m^3/h.
- At 10:46 am on January 6, 2011, due to a switching operation of injection pipe for the feed water system in preparation for a test run of the core spray pump installed at T/B, we decreased the feed water system injection from approx. 0.2 m^3/h to 0m^3/h and increased core spray system water injection from approx. 9.2 m^3/h to 9.3 m^3/h. The switching operation was finished at 11:11 am, thus the feed water system injection was adjusted from approx. 0m^3/h to 1.0m^3/h as well as core spray system water injection from approx. 9.3 m^3/h to 9.0 m^3/h at 11:25 am.
- At 11:53 am on January 7, we completed the switching operation of injection pipe for the feed water system in preparation for a test run of the core spray pump installed at T/B of Unit 2, we increased the feed water system injection from approx. 0.5 m^3/h to 2m^3/h and decreased core spray system water injection from approx. 9 m^3/h to 8 m^3/h for Unit 2 reactor.
- At 10:04 am on January 9, because the replacement work of the water injection piping arrangement from the water feed system in association with the trial run of reactor injection pump in Turbine Building has been completed, we have adjusted the amount of injected water to the reactor gradually. For the amount of injected water to the reactor, we adjusted water injection from the reactor feed water system from approx. 1.7 m^3/h to 3.0 m^3/h, and water injection from the core spray system for approx. 8.1 m^3/h to 7.0 m^3/h.
- As it was confirmed that there was fluctuation in the amount of water injection for the reactor at 11:20 am on January 13, 2012, we adjusted the rate of water injection from water feeding system from approx. 2.5m^3/h to approx. 3.0m^3/h. We also adjusted the rate of water injection from piping of core spray system approx. 7.2m^3/h to approx. 7.0m^3/h.

< Treatment of Accumulated Water>

[Year 2011]

- At 4:10 pm on July 30, we started transferring accumulated water from the vertical shaft of Unit 2 turbine building to Centralized Radiation Waste Treatment Facility (Process Main Building). We stopped transfer at 6:49 pm, August 2.
- At 7:09 am on August 4, we started transferring accumulated water from the vertical shaft of Unit 2 Turbine Building to Centralized Radiation Waste Treatment Facility (Process Main Building). At 4:56 pm on August 9, we stopped the transfer.
- At 4:47 pm on August 10, we started transferring the accumulated water from the vertical shaft of Unit2 Turbine Building to Centralized Radiation Waste Treatment Facility (Process Main Building). At 11:43 am on August 16, we stopped transfer.

- At 4:19 pm on August 18, we started transferring the accumulated water from the vertical shaft of Unit2 Turbine Building to Centralized Radiation Waste Treatment Facility (Process Main Building).
- At 10:03 am on August 25, we stopped transferring accumulated water from vertical shaft of Unit 2 Turbine Building to the Centralized Waste Treatment Facility (Process Main Building), and started transferring to Centralized Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 9:31 am, August 30, we stopped transfer of accumulated water from the vertical shaft of turbine building of unit 2 to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]) and started transfer of accumulated water to Centralized Radiation Waste Treatment Facility (Process Main Building).
- At 10:11 am on September 6, as it was confirmed that there was a decrease of accumulated water level at the basement of Unit 2 turbine building, we started transferring accumulated water from Unit 2 condenser to the basement of Unit 2 turbine building. At 2:54 pm on the same day, we stopped transiting.
- At 10:00 am on September 7, we started transferring accumulated water from Unit 2 condenser to the basement of Unit 2 turbine building. At 4:07 pm on the same day, we stopped transfer.
- At 9:35 am on September 13, we stopped transferring accumulated water at Unit 2 turbine building vertical shaft to Centralized Radiation Waste Treatment Facility (Process Main Building), and at 9:51 am, we started transferring accumulated water to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- To change transfer route of accumulated water of Unit 2, at 1:16 pm on October 4, we stopped transfer of accumulated water from vertical shaft of turbine building of Unit 2 to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]). At 1:48 pm on October 6, we started to transfer accumulated water from underground floor of turbine building of Unit 2 to centralized radiation waste treatment facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]) through the new route.
- At 9:07 am on October 12, for blocking work of opening section on the basement of Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]), we stopped transferring accumulated water from the basement of turbine building to High Temperature Incinerator Building. At 2:17 pm on October 13, we restarted transferring from the basement of Unit 2 turbine building to the Centralized Waste Treatment Facility (Process Main Building).
- At 9:10 am on October 18, we suspended the transfer of accumulated water from the basement of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Process Main Building) due to the suspension of the water treatment facility.
- At 10:12 am October 20, transportation of accumulated water from unit 2 turbine building basement to Centralized Radiation Waste Treatment Facility (Process Main Building) was started.
- At 9:18 am on October 24, transportation of accumulated water from the basement of Turbine Building of unit 2 to Centralized Radiation Waste Treatment Facility (Process Main Building) was stopped temporally by the pumps change. After the pump changes, the transportation was re-started at 9:34 am on the same day.
- For the purpose of changing transfer route, at 9:32 am on October 28, we stopped transfer of accumulated water from underground of turbine building of Unit 2 to centralized radiation waste treatment facility (process main building). At 9:54 on the same day, we changed transfer route and started transfer of accumulated water from underground of turbine building of Unit 2 to centralized radiation waste treatment facility (Miscellaneous Solid Waste Volume Reduction Treatment Building)[High Temperature Incinerator Building]).
- At 10:02 am on October 31, transfer of accumulated water from Unit 2 turbine building underground to centralized radiation waste treatment facility(Miscellaneous Solid Waste Volume Reduction Treatment Building [High

Temperature Incinerator Building]) is suspended.

- At 9:38 am on November 4, we started transferring accumulated water from the basement of the Unit 2 turbine building to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 3:00 pm on November 8, as the power supply of Unit 2 accumulated water transfer pump will be stopped as the preparation of the power source reinforcement work, we stopped transferring accumulated water from the basement of Unit 2 turbine building to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 9:10 am on November 10, we started transferring accumulated water from the basement of the Unit 3 turbine building to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building])
- At 8:59 am on November 30, we stopped the transferring accumulated water from the basement of Turbine Building of Unit 2 to the centralized radiation waste treatment facility (miscellaneous solid waste Volume reduction treatment building [high temperature incinerator building]).
- At 6:03 pm on November 30, we started the transfer of the accumulated water from the basement of Turbine Building of Unit 2 to the centralized radiation waste treatment facility (miscellaneous solid waste Volume reduction treatment building [high temperature incinerator building]). At 7:51 am on December 13, we stopped the transfer of the accumulated water from the basement of Turbine Building of Unit 2 to the centralized radiation waste treatment facility (miscellaneous solid waste Volume reduction treatment building [high temperature incinerator building]) in order to stop power supply to Unit 2 accumulated water transfer pump for power supply enhancing work.
- At 10:12 on December 17, we started transferring accumulated water from the basement of Unit 2 turbine building to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and Process Main Building). At 12:24 pm on the same day, we stopped the transfer since the water level at Unit 2 turbine building did not change. Then we confirmed at the site that the switching valve of the transfer line was closed and that there was no leakage from the line. Then we opened the valve and restarted the transfer at 1:22 pm on the same day. At 9:58 am on December 18, we stopped the transfer.
- At 1:57 pm on December 21, transfer was started from Unit 2 turbine building to the Centralized radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High temperature incinerator building] and Process Main Building). At 9:42 am on December 23, the transfer was suspended.
- At 10:10 am on December 26, we started to transfer accumulated water from the basement of turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 9:54 am on December27, we stopped transfer.
- At 3:22 pm on December 28, we started to transfer accumulated water from the basement of turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). We stopped to transfer them at 9:44 am, on January 3, 2012.

[Year 2012]

- At 9:30 am on January 5 2012, we started transferring accumulated water from the ground floor of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building) . At 9:27 am on January 8, we stopped the transferring.
- At 9:47 pm on January 8, 2012, we started transferring accumulated water from the basement of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment

Building [High Temperature Incinerator Building] and the Process Main Building) . At 8:05 am on January 9, we stopped the transferring.

- At 9:51 pm on January 9, 2012, we started transferring accumulated water from the basement of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building) . At 7:57 am on January 10, we stopped the transferring.
- At 8:17 am on January 10, 2012, we started transferring accumulated water from the basement of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (the Process Main Building). At 3:21 pm on January 11, we stopped the transfer.
- At 3:45 pm on the same day, we started transfer of the accumulated water from the basement of the Unit 2 turbine building to the centralized radiation waste treatment facility (the miscellaneous solid waste volume reduction treatment building [the high temperature incinerator building] and the process main building). At 8:02 am on January 12, we stopped the transfer.
- At 9:55 am on January 12, we started transferring accumulated water from the basement floor of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 7:58 am on January 13 we stopped this transfer.

* At 2:46 pm on January 13, we started transferring accumulated water from the basement floor of the turbine building of Unit 2 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 8: 07 am on January 14, transfer was stopped.

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＜Alternative Cooling of Spent Fuel Pool＞

[Year 2011]

- At 10:03 am on September 6, we stopped the operation of Spent Fuel Pool Cooling and Filtering System of Unit 2 due to cleaning the secondary cooling tower of circulating cooling system in the spent fuel pool for Unit 2. At 10:42 am on the same day, we resumed its operation.
- At 11:04 am on November 6, we started operation of radioactive material removal instruments for the spent fuel pool of Unit 2. After its continuous operation for a month, the concentration of radioactive materials is expected to go below the level of 10^2, the facilities finished its operation on December 5. Sampling analysis of water in the spent fuel pool thereafter confirmed that the concentration of radioactive material actually decreased to the level of 10^2 from the level of 10^5 before the removal operation.
- At 4:24 pm on November 8, we stopped operation of radioactive material removal instruments for the spent fuel pool of Unit 2 in order to conduct switching work of the power source to enhance security of power source. At 8:47 on November 9, we restarted operation of radioactive material removal instruments for the spent fuel pool of Unit 2.
- At 5:41 am on November 9, cooling system of spent fuel pool was stopped due to the switching work of electricity to enhance security of electricity source. (The temperature of the spent fuel pool at 5:41 am: 23.9℃.) At 8:20 pm on the same day, alternative cooling system was operated. (The temperature of the spent fuel pool at 8:20 pm: 26.3℃
- At 10:30 am on November 12, we temporarily stopped operating radioactivity material removal facility for spent fuel pool of Unit 2, and started to change adsorption tower. Cooling spent fuel pool by circulated cooling system was kept operating. After that we completed change of adsorption tower and restarted operating the facility at 12:05 pm. We hereafter change adsorption tower in radio activity removal facility for spent fuel pool appropriately.
- At 9:12 am on November 28, the alarm indicating that the difference of flow rates between at the entering and at the exit of the primary pump at the alternative cooling system for the spent fuel pool is big went off, and the system automatically

stopped. At 9:16 am on the same day we checked the site and no abnormality such as no leakage was confirmed. Then, considered the cause is stuck of dust in the pipe of flow sensor from the investigation result, at 11:50 am on November 29, we started the system and flushed. Then, we confirmed the flow sensor was operating normally. We will monitor the status of the system operation.

- At 11:13 on November 30, the alarm went off at the alternative cooling system in the Fuel Pool Cooling and Filtering System indicating that the difference of the flow rate between at the inlet and at the outlet is large and the system automatically stopped its operation. At 11:34 pm on the same day, no leakage was confirmed by the site inspection. At 11:00 pm on the same day, the temperature of spent fuel pool was 22.7 ℃ and the anticipated temperature increase was 0.3 ℃/h. As there is sufficient buffer, the inspection is scheduled during the morning of December 1. However, the inspection, the repair work and the cause analysis is rescheduled to December 2 as it turned out that the material preparation for such work needs time. On December 2, it was estimated that air or foreign materials entered the detection line. We conducted flushing and fulfilled it with clean water and restarted cooling the spent fuel pool at 1:50pm on the same day. (As at restart temperature of water was 28.0℃.)
- At 4:17 am on December. 7, on the alternative Spent Fuel Pool cooling system of Unit 2, the alarm indicating that the difference of flow rates between at the entering and at the exit of the primary pump is big went off, and the system stopped automatically. At 4:41 on the same day, after field investigation, no defect such as leakage was confirmed. Currently the cause is under investigation,. At 4:00 am, the temperature of Spent Fuel Pool was 18.4 degree C, the assumed increase of temperature is 0.3 degree C/h, from the viewpoint of Spent Fuel Pool temperature, there is still enough allowance, so that there is no problem. After that, as any troubles are not detected although we conducted flushing of flow rate measure and detection line and filling water, the cause of the alarm was not identified. As temporary operation procedure to identity the cause, we deleted the condition of automatic shutoff by the alarm indicating that the difference of flow rates between at the entering and at the exit of the primary pump is big. In addition, for the alternative monitoring method, we strengthen monitoring of the water level of skimmer surge tank and change the operation procedure to stop the system manually when system troubles occurred. After that, at 11:37 am on December 10, we restarted cooling of the spent fuel pool by this system. (Water temperature of spent fuel pool at the injection restarted :31.3 ℃)
- At 3:53 pm on December 12, the annunciator alerted for the Unit 2 SFP alternative cooling system, which showed the difference between inlet and outlet flow at the primary pump exceeded the limit. Any abnormalities like water leakage were not observed by patrolling at the site. Currently the automatic trip system by the annunciator is temporarily removed, and monitoring the level of the skimmer surge tank is enhanced as the alternative monitoring measure. The cooling system will be manually tripped if there are abnormalities on the skimmer surge tank level, which is confirmed there is no change on the level. At 5:18 pm, after vibrated the instrument piping, it was confirmed the annunciator was cleared. It is planned to enhance the monitoring after the inspection of flow meters and the flushing of detection lines. There is no problem on the SFP cooling as the alternative cooling system is continuously operated.
- At 6:54 on December 14, an alarm went off indicating that there was a significant gap in the flow rates at the inlet and the outlet of the primary system pump of the spent fuel pool alternative cooling system of Unit 2. There was no accident such as a leakage found at the site. Later we implemented a vibration experiment on the instrumentation piping and confirmed that the alarm has stopped. Hereafter, we will check the flow rates every one hour. The spent fuel pool alternative cooling system has been kept in operation without any trouble in cooling

  The alarm went off again for the same reason at 3:06 am of December 19 and 5:04 am of December 20. We implemented a vibration experiment on the instrumentation piping and confirmed that the alarm has stopped.
- At 3:03 pm on December 20, we stopped the alternative cooling system of the Spent Fuel Pool of Unit 2 due to inspections in the flow rate detector of the system,

This is scheduled to last until around 2:00 pm of December 23 and during this time we are expecting that the temperature of the spent fuel pool will rise by 21 ℃ (temperature at the time the we stopped the system: 15.4 ℃). After that, deposits were piled up inside the inlet and outlet pipes of flow meter when we cut those pipes for inspection. Therefore, we cleaned up the pipes to remove the deposits. After the completion of the inspection of the flow meter, at 2:18 pm on December 23, we started the water injection system and confirmed that there was no fluctuations in water flow difference (water temperature of spent fuel pool at the time of system start: 26.6 ^{o}C).

- At 1:58 pm on December 26, in the alternative cooling system of the spent fuel pool of Unit 2, as the inhale pressure of the primary circulating pump showed the tendency of decrease, we stopped the pump in order to conduct flushing of the strainer on its entry side and suspended cooling of the spent fuel pool (the temperature of the pool at the time of the suspension was approx. 14.2℃)

[Year 2012]

<Injection of nitrogen gas into Primary Containment Vessel>

[Year 2011]

- From 5:52 am on August 3, in order to replace the nitrogen gas injector device, we stopped nitrogen gas injection into the Primary Containment Vessel of Units 1 to 3. After completion of the replacement, we restarted injection of nitrogen gas at 8:29 am. We continued injection of nitrogen gas with a backup injector from 5:58 am to 8:27 am.
- At 12:30 pm on October 6, we arranged the amount of nitrogen injected to the reactor containment vessel of Unit 2 to 13.5 m^3/h because we found the increase in amount of injected nitrogen.
- At 5:55 pm on October 18, since we confirmed reduction of injection volume of nitrogen gas to the primary containment vessel of Unit 2, we adjusted the injection volume to approx. 14m^3/h.
- Regarding the concentration of hydrogen in the exhaust gas of the gas control system for the Primary Containment Vessel of Unit 2, we found that the concentration of hydrogen which was approx. 1 % at the commencement of full-scale operation increased to approx. 2.3 % as of 5:00 pm on October 29. Therefore, at 6:10 pm on October 29, we adjusted nitrogen gas injection rate from approx. 14 m^3/h to 16.5 m^3/h in order not to exceed the inflammable limit concentration (4 l%).
- It is confirmed that hydrogen concentration in the exhaust gas of gas monitoring system inside the Unit 2's Primary Containment Vessel increased to approximately 2.7 % as of 5:00 pm on October 30. Therefore, we adjusted the amount of nitrogen gas injection to the Primary Containment Vessel to approximately 21 m^3/h from approximately 16.5 m^3/h at 6:10 pm on the same day so that hydrogen concentration in the exhausted gas would not surpass the combustible limiting concentration (4%).
- At 12:40 pm on November 3, we started the work to install an additional flow meter into the nitrogen gas injection line into Unit 2 to improve the reliability of the nitrogen injection. It was finished at 2:00 pm on the same day, For this work the nitrogen injection was suspended for approximately 10 minutes, however, there were no significant changes in the parameters of Unit 2.
- Hydrogen concentration in the exhaust gas of the gas management system of Unit 2 primary containment vessel was increased from 2.7% (at 6:10 pm, October 30, when the last change of the amount of nitrogen filling) to 2.9% (at 4:30 pm, November 3). Therefore, at 4:50 pm that day, the amount of nitrogen gas filling was adjusted from approximately 21 m^3/h to 26 m^3/h so that hydrogen concentration in the exhaust gas does not exceed inflammability limiting concentration (4%)..
- In order to construct the nitrogen injection line direct to the reactor branched by the nitrogen injection line into the primary containment vessel, at 1:47 pm on November 29, we temporarily stopped nitrogen injection into the primary containment vessel of Unit 2. Then, we restarted Nitrogen injection into the primary containment vessel of Unit 2. At 2:37 pm on the same date, we confirmed the nitrogen injection amount (26m^3/h) into the primary containment vessel was stable.

At 1:45 pm on November 30, we started nitrogen injection to the Reactor Pressure

Vessel.

At 2:47 on the same day, as we confirmed nitrogen injection had not increased, we temporally stopped the operation. The cause is under investigation. We are continuing nitrogen injection into the primary containment vessel The inspection thereafter revealed that the valve which was not described in the operation manual was not open. At 10:46 am on December 1, we restarted the injection operation. At 11:00 am, injection amount reached the scheduled amount of 5 m^3/h. Along with this operation, in order to balance the injected amount of nitrogen into the Reactor Pressure Vessel and the Primary Containment Vessel of Unit 2 and the exhaust amount from the gas management system, the exhaust amount from the system was adjusted from approx. 22 m^3/h to approx. 34 m^3/h

- At 10:25 am on December 2, we adjusted the volume of nitrogen injected into the Reactor Pressure Vessel from approx. 5Nm^3/h to approx. 10Nm^3/h. In addition, in order to balance the volume of nitrogen injected into the Reactor Pressure Vessel and the Primary Containment Vessel of Unit 2 and the volume of exhaust air from gas control system, we adjusted the volume of exhaust air from gas control system of the Primary Containment Vessel from approx. 34Nm^3/h to approx. 39Nm^3/h at 11:20 am on the same day.
- At 2:16 pm on December 7, in order to secure the sufficient time before hydrogen reaching the flammability limit in case the nitrogen injection facilities stop its operation in the Unit 2 Reactor Pressure Vessel, nitrogen injection amount into the RPV was increased from 10 m^3/h to 13 m^3/h. As it is considered that there would be sufficient time in the Unit 2 Primary Containment Vessel, the nitrogen injection amount into the PCV was decreased from 26 m^3/h to 20 m^3/h.
- At 4:15 pm on December 8, in order to secure the sufficient time before hydrogen reaching the flammability limit in case the nitrogen injection facilities stop its operation in the Unit 2 Reactor Pressure Vessel, nitrogen injection amount into the RPV was increased from 13 m^3/h to 14.5 m^3/h. As it is considered that there would be sufficient time in the Unit 2 Primary Containment Vessel, the nitrogen injection amount into the PCV was decreased from 20 m^3/h to 16.5 m^3/h.
- On December 21, regarding nitrogen injection to the PCV and gas exhaust amount from the PCV gas controlling system, change in nitrogen injection amount and gas exhaust amount from the gas controlling system was conducted based on the past operation. At 2:52 pm on the same day, injection of nitrogen to the PCV was adjusted from approx. 16m^3/h to approx. 10 m^3/h. At 3:15 pm. A gas exhaust amount from gas controlling system was adjusted from approx. 40m^3/h to approx. 32 m^3/h.

[Year 2012]

- At 12:33 pm on January 6, 2012, in order to decrease amount of steam generated as well as pressure in PCV in preparation for inner inspection for PCV, amount of nitrogen injection to PCV was adjusted from approx. 10Nm^3/h to approx. 13Nm^3/h. Also, at 1:26 pm, exhaust amount from PCV gas management system was adjusted from approx. 30Nm^3/h to approx. 35Nm^3/h.
- At 10:10 am on January 11, due to the preparation of inspection of the Primary Containment Vessel(PCV) of Unit 2, we adjusted the amount of nitrogen injected to the PCV from 13m^3/h to 10m^3/h to reduce the pressure of the inside.

<Others>

[Year 2011]

- From 10:39 am to 11:13 am on August 9, we conducted sampling of gas in the Primary Containment Vessel.
- At 10:35 am on August 24, we started injection of hydrazine to spent fuel pool of Unit 2 through the circulating cooling system. At 12:29 pm on the same day, we stopped injection of hydrazine. (Hydrazine is injected as appropriate.)
- From 10:35 am to 1:20 pm on August 29, we conducted sampling of dust at the openings (blow out panel) of Reactor Building.
- From 10:05 am to 11:05 am and from 2:43 pm to 3:43 pm on September 17, we conducted sampling of dusts at the openings (blow out panel) of Reactor Building.
- From 9:26 am to 10:26 am on October 5, we conducted sampling of dusts at the openings (blow out panel) of Reactor Building.
- From 10:00 am to 12:00 pm on October 13, we conducted sampling of dusts at the

openings (blow out panel) of reactor building of Unit 2.

- From 11:20 am to 11:52 am on October 21, aiming to restore the function of primary reactor water level gauge, we filled the measurement piping with water from makeshift gauge (gauge in the makeshift lack) in the primary reactor Water Level Gauge in Unit 2.
- From 10:31 am to 11:31 am on October 25, we conducted dust sampling at the opening (blowout panel) of the reactor building of Unit 2.
- At 1:05 pm on October 26, we started nitrogen purge of the designate system after confirming that hydrogen is stored with the density of 6.5 % when connecting piping arrangements on October 20, 2011, as one of the construction work to install gas monitoring system inside the Primary Containment Vessel. We finished the nitrogen purge at 1:42 pm because we confirmed that the hydrogen density was 0%.
- At 10:30 am on October 27, we conducted leak test of the system as a part of construction to settle the gas control system of Primary Containment Vessel at the reactor building of Unit 2. As a result, we confirmed in-leak volume to the system had no problem. In addition, we conducted tentative operation test. As a result, we confirmed operational aspect of electric heater and exhaust fun had no problem.
- At 12:53 pm on October 28, we started up the exhaust fan of gas management system of primary containment vessel in the reactor building of Unit 2 and commenced commissioning. After we confirmed the stable operation of the system, from 6:00 pm on the same day, we put the system in operation.
- We found a possibility to detect short-half-life radionuclide such as Xe-133 and Xe-135 according to our radionuclide analysis sampled on November 1 by the gas management system of the reactor containment vessel of Unit 2. We continued to monitor the temperature, pressure and data from monitoring post and there was no significant fluctuation from those data. As we can't be denied a possibility of fission reactions, we decided to start injecting boric acid water from reactor feed water system at 2:48 am on November 2 and stopped it at 3:47 pm on the same day. At around 7:20 pm on the same day, Japan Atomic Energy Agency evaluated that the TEPCO's analysis result of the short-half-life radionuclide such as Xe-133 and Xe-135 detection was valid. We consider that they were generated by the spontaneous fission on the grounds that the concentration of detected short-half-like radionuclide (Xe-135) is low, that short-half-like radionuclide (Xe-135) was detected even after the boric acid, which stops nuclear fission chain reactions, was injected, and that the parameters of the reactor were not significantly changed.
- At 2:20 pm on November 4, we arranged the amount of emission from the gas management system from $14m^3/h$ to $22\ m^3/h$ in order to balance the amount of nitrogen injected to the reactor containment vessel and exhaust gas from the gas management system of Unit 2.
- On November 9, sampling survey of gas at the gas management system of Unit 2 primary containment vessel was implemented. According to its analysis, it is considered that recriticality was not occurred because radioactive Xe135 at the entrance of gas management system of Unit 2 was below detection limit ($1.1\times10^{-1}Bq/cm^3$). In addition, Xe-135 ($1.9\times10^{-5}Bq/cm^3$) was detected by charcoal filter. This was measured value and evaluated to be the amount emitted from the gas management system. Thus, the value measured by gas vial was converted into the value of $1.1\times10^{-2}Bq/cm^3$ using achievement rate. This value was the same as $2.7\times10^{-2}Bq/cm^3$ that was evaluated before.
- On November 14, sampling survey of gas at gas management system of Unit 2 primary containment vessel was implemented. According to its analysis, it is considered that recriticality was not occurred because radioactive Xe-135 at the entrance of gas management system of Unit 2 was below the detection limit ($9.2\times10^{-2}Bq/cm^3$)
- We have conducted gas analysis at the primary containment vessel in the reactor building of Unit 2 by using gas management system since October 28, 2011. It was found that a part of measurement results collected on October 28, November 1, 2 and 14 were evaluated about 10% lower in terms of the concentration of radioactive materials due to computation process error. The errors were only affected number corrected, but not affected the criterion of criticality resumption nor evaluation results.
- On November 22, we sampled gases in gas management system in primary

containment vessel of Unit 2 to analyze nuclides. As a result of nuclides analysis, we evaluated that there is no recriticality since the density of Xe-135 is below the detection limits (1.1×10^{-1} Bq/cm^3) and that indicates the analyzed figure is below the determination criteria for recriticality such as 1 Bq/cm^3. Regarding Xe-135, we decided to use the sampling result at gas vial container at inlet in gas management system to evaluate the recriticality based on the “Report with regard to "Policy on the mid term security" for the Units 1 to 4 of Fukushima Daiichi Nuclear Power Station to Nuclear and Industrial Safety Agency at the Ministry of Economy, Trade and Industry (1) (revision)” (Press released on November 9th) because charcoal filter was used to detect Xe-135 and we evaluated that they are created by spontaneous fission.

※ Detection Limits Charcoal Filter: Order of 10^{-6}, Gas Vial Container: Order of 10^{-1}

-As of 5:00 pm on November 26, the indicator of the gas temperature of Suppression Chamber of Unit 2 read 52.7℃, but at 11:00 pm on the day we confirmed that it read “Overscaled” (digital recorder). Then, as of 5:00 am on November 27, it read 102.6℃. Though the readings were not stable, as there were no significant changes or variations in the temperatures of the same types of 2 thermometers and the pool water in Suppression Chamber, we have been investigating the causes for this event including the possibility of malfunction of the measuring instruments. Later, we inspected the measuring instruments and estimated that the readings were overscaled due to certain impacts on the signal detection line seeing that signal from the temperature detector is not stable. We will keep monitoring readings of this instrument and also monitor the temperature using instruments close to it.

- The indicator for the inside of the Primary Containment Vessel (Drywell) of Unit 2 (base line temperature of the air conditioning unit, local cooling equipment) read 78.2℃ as of 5:00 am on November 27 but at 6:50 am on the day it was confirmed that it read approximately 84℃, increasing in a staircase pattern. On the other hand, it was also confirmed that the temperature changes of the bottom of the Reactor Pressure Vessel and the water in the pool of the Suppression Chamber were smaller than that of the inside of the Primary Containment Vessel (Drywell) and that there was no significant change in the temperature.

Now we have been decreasing the flow rate of water injection as shown in the below and therefore it is expected that the temperature inside the Primary Containment Vessel will rise, but, as the line of which temperature rose in a staircase pattern was only one line of the five lines and the rest of the lines did not show the same changes, we have been investigating the causes for this event, including the possibility of malfunction of the measuring instruments. We will continue to monitor the temperatures. Later we inspected the instrument but got no data indicating malfunction, and the readings after the inspection are not different from those before. Therefore, we estimated that the signal detection line was somehow affected, which raised the temperature indicated. We will keep monitoring this instrument and also monitor the temperature using instruments close to it.

- At 7:11 pm on November 24, we adjusted the flow rate of water injection from Core Spray System from approx. 7.2 m^3/h to approx. 5.6m^3/h (for feed water system, the flow rate is kept at 2.9 m^3/h).
- On November 26 (from 10:18 am to 11:02 am), we adjusted the flow rate from Core Spray System from approx. 5.5 m^3/h to approx. 4.5m^3/h (for feed water system, the flow rate is kept at 3.0 m^3/h).

- On November 29, sampling survey of gas at the gas management system of Unit 2 primary containment vessel was implemented. As a result of the analysis, we regarded the situation was not recriticaly because the radioactive density at the gas management system of Unit 2 primary containment vessel was under ND ($1.1\times10^{-1}Bq/cm^3$), the criteria of recriticaly is 1 Bq/cc. Regarding Xe-135, its radioactive density was detected by charcoal filter* (we regarded spontaneous fission). According to the Report with regard to “Policy on the mid term security” for the Units 1 to 4 of Fukushima Daiichi Nuclear Power Station to Nuclear and

Industrial Safety Agency at the Ministry of Economy, Trade and Industry (1) (revision) (for public on November 9), the situation of recriticaly therefore should be regarded by the sampling survey of gas at the gas management system of Unit 2 primary containment vessel by vial.

* Detection Limit　Charcoal filter: 10^{-6} level, Vial: 10^{-1} level

- At 1:26 pm on November 30, we started injection of hydrazine into spent fuel pool of unit 2 by using circulating cooling system.
- From 12 pm to 2 pm on December 2, we conducted dust sampling at the opening of Unit 2 reactor building (blow-out panel).
- On December 2, we conducted sampling at charcoal filter and particulate filter of gas control system of Unit 2 Primary Containment Vessel.
- At 8:25 am on 6 December, dust sampling at opening part (blow out panel) of Reactor Building in Unit 2 was started. At 10:25 am, sampling was completed.
- On December 6 we conducted air sampling at the gas controlling system of the Primary Containment Vessel of unit 2. As a result we confirmed that at the exit of the gas controlling system of the Primary Containment Vessel, the level of xe-135 detected was below detection limit (1.1×10^{-1}Bq/cm^3) and below the recriticality standard 1Bq/cc
- At December 15 we conducted air sampling at the gas controlling system of the Primary Containment Vessel of unit 2. As a result we confirmed that at the exit of the gas controlling system of the Primary Containment Vessel, the level of xe-135 detected was below detection limit (9.1×10^{-2}Bq/cm^3) and below the recriticality standard 1Bq/cc.
- On December 22, we conducted the gas sampling of Unit 2 Primary Containment Vessel (PCV) Gas Control System. As a result of analysis, it was confirmed that the gas concentration of Xe-135 at the inlet of the PCV Gas Control System was below detective limit (1.0×10^{-1} Bq/cm^2) and lower than the standard of recriticality, 1 Bq/cc.
- On December 28, we sampled gases in gas management system in primary containment vessel of Unit 2 to analyze nuclides.　As a result of nuclides analysis, we evaluated that there is no recriticality since the density of Xe-135 is below the detection limits (1.1×10^{-1} Bq/cm^3) and that indicates the analyzed figure is below the determination criteria for recriticality such as 1 Bq/cm^3.

[Year 2012]

- On January 4 2012, we conducted sampling of the gas of the PCV gas management system. As a result of the analysis, we confirmed that at the entrance of the system Xenon 135 was below detection limit (1.0×10^{-1}Bq/cm^3), and below the re-criticality criterion which is 1Bq/cm^3.
- On January 11, 2012, we conducted sampling survey of the gas in the Unit 2 primary containment vessel gas management system. As a result of the analysis, we confirmed that at the gate of the system the density of xenon 135 was below the measurable limit (1.1×10^{-1} Bq/cm^3) and thus it was lower than the judgment criteria for the recriticality, 1Bq/cm$^{3.}$
- From 8:51 am to 1:05 om on January 13, 2012, we conducted the dust sampling at the open part of the Reactor Building (Blowout panel).
- On January 13, we conducted sampling of the charcoal filter of Unit 2 PCV gas control system.

【Unit 3】

<Water injection to the reactor>

[Year 2011]

- At 7:19 am on August 7, as we observed increase in the rate of water injection to reactor on unit 3, we adjusted water injection rate to approx. 9.0m^3/h.
- At 4:22 pm on August 10, as we observed fluctuation of reactor water injection rate, we adjusted the rate to approx 9.1m^3/h.
- At 7:30 pm on August 12, we adjusted the rate of injecting water at approx. 9.0m^3/h, as we confirmed the increase in the rate of injecting water to reactor.
- At 12:20 pm on August 18, we added and replaced flow regulating valves of water injection line of Unit 3. At 12:27 pm on the same day, we adjusted the rate of water

injection into the reactor at approx. 8.0m^3/h.

- At 1:00 pm on August 20, we adjusted the rate of water injection into the reactor at approx. 7.0m^3/h.
- At 2:09 pm on September 1, in order to restart injecting water to the reactor of unit 3 by core spray system in addition to feeding line, we started to adjust flow rate of injection. At 2:58 pm on the same day, we adjusted flow rate at approx.7.0m^3/h for injecting from feeding line and at 1.0 m^3/h for injecting from core spray system.
- At 2:50 pm on September 2, we adjusted flow rate at approx.7.0m^3/h for injecting from feeding line and at 2.0m^3/h for injecting from core spray system.
- At 2:37 pm on September 3, we adjusted the rate of water injection at approx. 7 m^3/h through reactor feed water system piping arrangement, and at approx. 3 m^3/h through core spray system.
- At 2:43 pm on September 5, we adjusted the rate of water injection through reactor feed water system piping arrangement to approx. 6.0 m^3/h. (Water injection through core spray system continues at approx. 3.0 m^3/h.)
- At 2:46 pm on September 7, we adjusted the rate of water injection for the reactor through reactor feed water system piping arrangement to approx. 5.0 m^3/h. (Water injection through core spray system continues at approx. 3.0 m^3/h.)
- At 2:01 pm on September 12, we adjusted the rate of water injection for the reactor through reactor feed water system piping arrangement to approx. 4.0 m^3/h. (Water injection through core spray system continues at approx. 3.0 m^3/h.)
- From 10:16 am to 2:15 pm on September 16, at increasing volume of water injecting into the reactor of Unit 3, we conducted injection of boric acid into the reactor. Thereafter, we increased injection rate of water through core spray system and at 3:05 pm adjusted at 8.0m^3/h (injection rate from feed water system remain at 4.0m^3/h).
- At 3:17 pm on September 22, we adjusted the volume of water injected at 3.0m^3/h from Feed Water System into Reactor Building of Unit 3 (while we continue injecting water at 8.0 m^3/h from Core Spray System).
- At 10:25 am on September 28, we switched water injection line to emergency line at Unit 1,2 and 3 for the trial run of mini flow line in the regular injection line set on the hill. At 2:02 pm on the same day, we switched back to the regular water injection line after the trial run. There was no change in the injection amount due to this work.
- At 9:47 am on October 26, for the water injection to the reactor, we switched from normal water injection line to emergency water injection line, due to the shutoff of facilities for power source reinforcement work. Along with the switching work, we adjusted the amount of water injection to the reactor to approximately 3.0m^3/h from water feeding system, and to approximately 8.0 m^3/h from Core Spray System. At 3:20 pm on the same day, we switched from emergency water injection line to normal water injection line due to completion of power source reinforcement work.
- On October 26, we replaced the vane to adjust flow amount of water injection line to the Unit 3's reactor in order to improve the ability to control the water injection amount.
- On November 4, due to inspection of Unit 3 reactor water injection pump, it was switched to Unit 1/2 reactor water injection pump. At 3:13 pm, together with this switch, water injection amount of feed water system was adjusted to approx.2.5 m^3/h, and that of the reactor core spray system to approx.8.1 m^3/h.
- At 4:05 pm on November 8, water injection to reactor of unit 3, as decrease of injection rate from feed water system was observed, injection rate was adjusted to approx. 3.0m^3/h (water injection continues from core spray system at approx. 8.0m^3/h).
- At 9:33 am on November 16, at the emergency feed water injection lines of Units 3, in order to increase the water flow controllability, we started additional work for flow control valves. It was finished at 11:41 am on the same day. For reference, It didn't affect the water injection to the reactor because the water injection uses usual feed water injection lines.
- At 3:33 pm on November 18, along with the adjustment of water injection amount of Unit 1, we adjusted the amount of water injection to the reactor of Unit 3 to approximately 2.5 m^3/h from water feeding system, and to approximately 8.1 m^3/h

from Core Spray System.

- At around 4:10 pm on November 18, water leakage of one drop in 3 seconds was observed from pressure hose connecting point of suction side of emergency feed water injection pump located upland of Unit 1. Valves before and after the hose were closed and isolated, and a saucer was placed to receive the drop. We confirmed the radiation dose in ambient air near the leaking point was not specifically different from surrounding area. There was no impact to the water injection to the Reactor because the pump was for emergency feed water injection and not in operation at that time. As the preparation for replacement of that hose was completed, we started the replacement work at 9:30 am on November 22. At 10:20 am on the same date, we completed the work. As we are injecting water to the Reactor by the main reactor water injection line, there is no impact to the water injection from this work.
- On October 28, after regular operation of the gas control system for PCV, Unit 2, since a relatively high density hydrogen was detected on October 29, we are intending to control the hydrogen density below the inflammable limit (4%) even if there is no steam, by directly including nitrogen into the RPV for Units 1 to 3.

  Until we have included nitrogen into RPV, in order to lower the hydrogen density of RPV by increasing the temperature and the steam ratio thereby, on November 24, we lowered the amount of water injection into the reactor of Units 1 to 3.

  Unit 3: At 7:19 am, the water injection amount by the reactor core system decreased from 8.5 m^3/h to 6.7 m^3/h. (the injection of feed water system is continuing at 2.3 m^3/h).

  After that, we monitored the temperature trend in the RPV and the PCV. Since the change of the temperature was small and there was a possibility of significant change of the temperature by further reduce of the water injection, we adjusted it from approx. 7.0 m^3/h to approx. 6.0 m^3/h through core spray system from 10:18 am to 11:02 am on November 26 (through reactor feed water system it remains unchanged, approx. 2.0 m^3/h). As we assumed that the hydrogen density of RPV was decreased from the result of the operation, at 11:25 am on December 10, we adjusted the water injection volume of the water feeding system from approx. 2.2 m^3/h to approx 3.2m^3/h to cool down the reactors more stably (The current water injection volume is approx 6.0m^3/h from the core spray system.)
- On November 29, since we observed decrease in water injection into the reactor, we adjusted the water injection amount 1.9m^3/h to 2.1m^3/h from feed water system from 10:13 am to 10:28 am. (The water injection amount from core spray system keeps 6.0m^3/h)
- At 5:47 pm on 5 December, Amount of water injected through feed water system was adjusted from approx. 2.0m^3/h to 2.2 m^3/h as the decrease of such amount was observed (Water injection through core spray system continues with approx. 6.0 m^3/h).
- At 10:13 am on December 9, as we observed reduction of the water injection rate, adjusted the rate from the feed water system from approx 2.0m^3/h to approx 2.2m^3/h, from the core spray facility from approx 6.2m^3/h to approx 6.1m^3/h
- At 11:10 am on December 11th, as we found that there was small vibration at the Flow Control Valve of Core Spray System, we adjusted water injection from Core Spray System to unit 3 from approx. 6.1 m^3/h to approx. 6.5 m^3/h, while we adjusted water injection from the Feed Water System from approx. 3.1 m^3/h to approx. 2.5 m^3/h. Because the vibration of the Flow Control Valve still continued, we adjusted water injection from the Feed Water System to approx. 3.0 m^3/h, and from Core Spray System to approx. 6.0 m^3/h. Because the vibration is tiny and would do little influence on pipe arrangements and others, we will study on its countermeasure later.
- At 10:47 on December 20, we decreased the water injected from the feed water pipe from 3.9m^3/h to 3.0m^3/h, and increased the water injected from the reactor core spray system pipe from 5m^3/h to 6m^3/h.
- At around 1 pm on December 22, it was found that the hose of Unit 3 Reactor Water Injection Line was swollen to the extent of 2 meter long. Although there was no leakage from the swollen hose, it was decided that the pump for Reactor water injection should be switched from the reactor injection pump on the hill to the

emergency motor pump and the hose should be replaced with new one.[+] At 7:12 pm on the same day, the emergency motor pump was started to operate. From 7:44 pm, the valve to the normal water injection line was closed in order to weep drain from the line. After the replacement of the hose, at 8:47 pm, the valve to the normal water injection line was opened to fill water in the line. At 10 pm, it was confirmed that there was no water leakage from the new hose, so that water injection to the Reactor was adjusted to about 3 m^3/hour from Reactor Feed Water System and about 6 m^3/hour from Reactor Core Spray System at about 10:30 pm. At 10:38 pm, the emergency motor pump was stopped. After that, it was checked that there was no leakage from the hose and its connection. During the hose replacement work, the water injection was continued and there was no remarkable change in temperature of the Reactor Pressure Vessel.

[+] Article 12 of Safety Regulation at Nuclear Facilities stipulates "operational limit" and "required measures if the operational limit is not satisfied" according to the facility management based on "the mid-term view point for securing safety". It also stipulates to respond based on the required measures if the operational limits is not satisfied. In the case of today's hose swollen, it was regarded to be sifted off the operational limit as planned (from 6:35 pm on December 22 to 10:43 pm on the same day) from the proactive maintenance point of view, so that the hose replacement work was implemented accordingly.

- On 10:30 am on December 23, the change of injection water flow to Reactor was found so that water injection from Core Spray System was adjusted from approx. 6.5 m^3/h to 6.0 m^3/h (water injection from feed water system was remained unchanged as approx. 3.0 m^3/h).

[Year 2012]

- At 10:05 am on January 10, because of the replacement work of the water injection piping arrangement from the water feed system in association with the commissioning of reactor injection pump in Turbine Building of Unit 3, we have controlled the amount of injected water to the reactor gradually. The amount of injected water to the reactor of Unit 3 from the reactor feed water system was adjusted from approx. 3.0 m3/h to approx. 2.0 m3/h, and the amount from the core spray system was adjusted from approx. 6.0 m3/h to approx. 7.0 m3/h.
- At 10:18 am on January 11, because of the replacement work of the water injection piping arrangement from the water feed system in association with the commissioning of reactor injection pump in Turbine Building of Unit 3, we have controlled the amount of injected water to the reactor gradually. The amount of injected water to the reactor of Unit 3 from the reactor feed water system was adjusted from approx. 1.9 m^3/h to approx. 1.0 m^3/h, and the amount from the core spray system was adjusted from approx. 7.0 m^3/h to approx. 8.0 m^3/h.
- At 10:30 am on January 12, 2012, we adjusted the amount of the water injection from approx. 1 m^3/h to 0 m^3/h (the reactor feed water system), from approx. 8.2 m^3/h to approx. 9.0 m^3/h (the core spray system) in order to switch the injection pipe arrangement of the reactor feed water system for preparation for test operation of the reactor injection pump in the turbine building. At 11:00 am, we adjusted the amount of the water injection from approx. 0 m^3/h to 1 m^3/h (the reactor feed water system), from approx. 9 m^3/h to approx. 8 m^3/h (the core spray system) since the switch work was completed.
- As the switching of water injection system of the reactor feed water system for the preparation of test operation of the reactor injection pump in the turbine building was completed, water injection amount is adjusted by stages. At 11:13 am on January 13, 2012, we adjusted the water injection, from approx. 0.5m^3/h to approx. 2.0m^3/h for the reactor feed water system, and from approx. 8.3m^3/h to approx. 7.0m^3/h for the core spray system.
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<Alternative cooling of Spent Fuel Pool>

[Year 2011]

- At 3 pm on September 30, in order to add transformer control panel as power supply for works related Unit 3, the power supply for Spent Fuel Pool Cooling was temporary stopped. At 7:26 pm, the power was restored and the cooling was resumed.

- At 2:30 pm on November 7, we suspended the alternative cooling in order to clear clogs in the primary strainer resulted from reverse cleaning, as a countermeasure against the alarm suction pressure decrease of primary coolant system pump in spent fuel pool of Unit 3 at Fukushima Daiichi Nuclear Power Station (water temperature of spent fuel pool as of suspension: approx. 24.8℃). After finishing the reverse cleaning of the primary strainer, then, at 7:17 pm on the same day we restarted the alternative cooling (water temperature of spent fuel pool as of restart: approx. 22.5℃ ※It is supposed that water temperature as of restart became lower than that as of suspension because water in skimmer surge tank was cooled down by outside air.
- At 1:32 pm on November 17, in order to clean up the 1st system strainer of Unit 3 spent fuel pool circulating cooling system as measures for an alert caused by decrease of suction pressure at 1st system pump of circulating cooling system, circulating cooling was temporarily stopped (Water temperature of spent fuel pool at the time that circulating cooling was stopped: approx. 19.2 ^{o}C). At 2:55 pm on the same day, the cleaning of the 1st system strainer by reverse flow washing, the alternative cooling was resumed (Water temperature of spent fuel pool at the time that circulating cooling was resumed: approx. 18.8 ^{o}C, which was assumed that water in the skimmer surge tank was cooled down by ambient air so that the water temperature of spent fuel pool when the circulating cooling was resumed was lower than that when the circulating cooling was stopped.)
- Around 11:00 pm on November 18, it was confirmed that coolant water temperature at the heat exchange facility exit of unit 3 alternative cooling facility for the fuel spent pool tends to increase (16.5℃ at 8 pm → 17.3℃ at 11 pm). At 7:00 am on November 19, it was confirmed main tap for watering was closed. The temperature decreased after tap opening (19.5℃ at 5 am → 17.9℃ at 8 am). The research for tap close is currently underway.
- On November 19, it was confirmed that coolant water temperature at the heat exchange facility exit of unit 3 alternative cooling facility for the fuel spent pool is once again in the trend to increase (17.9℃ at 8 am → 19.6℃ at 2 pm). Spray of water is being continued, however, as it was found that net in the spray tank is clogged up, from 4:11 pm to 4:50, there was a switch from Unit 3 spent fuel pool alternative cooling facility 2 cooling tower (A) to (B). Currently, the temperature is stable.
- At 2:00 am on November 27, we confirmed the difference in temperature at the gateway of the heat exchanger on the primary side of the Unit 3 spent fuel pool alternative cooling equipment was getting small (inlet temperature: 19.7℃, outlet temperature: 19.0℃). However, as we could figure out that it did not affect the cooling of the spent fuel pool immediately, we decided to conduct a field investigation after dawn. At 6:33 am, as a result of the field investigation, we confirmed the main valve of watering equipment was closed and therefore we opened it and filled with water for watering. As a result, we could confirm that the outlet temperature fell down (as of 7:00 am on November 27, inlet temperature: 20.3℃, outlet temperature: 15.1℃). Considering this result, it is confirmed that the cause for the difference in temperature is that the valve was closed down and the cooling water was not supplied. We will further investigate the reason of the closing down of the valve (the temperature of the inlet port of the heat exchanger on the primary side = the temperature of the spent fuel pool).
- At 9:01 am on December 2, we interrupted the operation of the alternative cooling in order to replace the inside mesh of the primary strainer as a countermeasure against the decrease in inhale pressure of the primary pump for alternative cooling of the spent fuel pool. (The temperature of the spent fuel pool as at the interruption: 18℃) After we replaced the mesh inside the primary strainer, we restarted the operation of the alternative cooling (The temperature of the spent fuel pool as at the restart: 18.1℃).
- At 9:43 am on December 22, At the Alternative Cooling apparatus of Spent Fuel Pool Cooling and Filtering System of Unit 3, since the suction force of primary circulating pump decreased, we stopped the pump to conduct flushing of

entrance-side strainer of primary circulating pump and stopped cooling of spent fuel pool. (The temperature of pool is approx. 13℃ when the pump stopped) Then, we flushed the strainer so that the suction force recovered. Thus, at 11:06 am on the same day, restarted the pump and began to cool the spent fuel pool. (The temperature of pool is approx. 13℃ when the pump restarted)

- At 2:00 pm on December 26, in the alternative cooling system of the spent fuel pool of Unit 3, as the inhale pressure of the primary circulating pump showed the tendency of decrease, we stopped the pump in order to conduct flushing of the strainer on its entry side and suspended cooling the spent fuel pool (the temperature of the pool at the time of the suspension was approx. 13℃). After flashing, as inhale pressure of the pump has recovered, at 4:32 pm on the same day, the pump was restarted and cooling of spent fuel pool was restarted (the temperature of the pool at the time of restart was approx. 13℃).
- At 10:23 am on December 29, due to the declining tendency of the suction pressure of the primary system circulating pump of the spent fuel pool alternative cooling system of Unit 3, we stopped the pump and then stopped cooling of the spent fuel pool temporarily to conduct flushing of the intake side strainer of the pump (water temperature at the stoppage: approx. 12.4℃). After that we conducted flushing and the suction pressure of the pump recovered, therefore at 0:09 pm on the same day, we restarted the pump and resumed cooling of the spent fuel pool (water temperature at resuming: approx. 12.5℃).
- At 10:27 am on December 30, since inlet pressure of the primary circulation pump was decreasing in the alternative cooling system of the spent fuel pool of Unit 3, cooling of the spent fuel pool was temporary stopped by shutting down the pump, in order to flush the inlet strainer of the primary circulation pump. (Temperature of the spent fuel pool was approx. 13.0℃ at the time of shutdown.) Flushing was conducted subsequently, and since inlet pressure of the pump was recovered, cooling of the spent fuel pool resumed by restarting the pump, at 1:42 pm of the same day. (Temperature of the spent fuel pool was approx. 13.1℃ at the time of restart.)
- Since inlet pressure of the primary circulation pump in the alternative cooling system of the spent fuel pool of Unit 3 frequently tended to decrease due to the effect of clogging of the inlet strainer of the pump, the pump was stopped at each time in order to flush the strainer. However, since this tendency is supposed to continue and the temperature of the spent fuel pool is sufficiently low, which is approx. 13.0℃, and there is enough margin from the operational limit value (upper limit) by the safety regulation, which is 65.0℃, we determined to stop the pump by January 4 of 2012 and temporary stop the cooling of spent fuel pool, considering the exposure dose during the flushing.

  At 4:54 pm on December 30 of 2011, the pump was stopped. (Temperature of the spent fuel pool was approx. 13.3℃ at the time of shutdown.) It is valuated that the temperature rise of the spent fuel pool due to the shutdown of the pump is approx. 5 to 6 degrees for a day. And it is planned that this pump operates for one time in a day to check the temperature of the spent fuel pool during this temporary operation, since December 31, 2011.

[Year 2012]

- At 9:56 am on January 4, 2012, we restarted to operate the alternative cooling system of spent fuel pool. After restarting, we will implement flushing of strainer with consideration of the suction pressure of the primary system circulating pump.
- Since the suction of the primary circulating pump of the spent fuel pool substitute cooling system of Unit 3 was continuously low, at 11:46 am on January 5 2012, we stopped the pump and temporarily suspended the cooling of the spent fuel pool to replace the strainer at the entrance of this system. (Temperature at the time of suspension: 23.7℃) After that, since we finished the replacing the strainer, at 4:27 pm on January 7, we restarted the pump and the cooling of the spent fuel pool and confirmed restoring the suction of the pump. (Current Temperature: 27.5℃)

At 9:35 am on January 12, we stopped the Unit 3 spent fuel pool alternative cooling system in order to install the radioactive materials removal equipment in the Unit 3 spent fuel pool. After we completed the installation of the instruments, at 4:46 pm on the same day we restarted the cooling of the pool (temperature of the spent fuel pool: 12.7℃ at the time we stopped cooling, 13.1℃ after we restarted cooling).

- At 3:18 pm on January 14, we started operation of the radioactive material removal instrument for the spent fuel pool in Unit 3

<Treatment of Accumulated Water>

[Year 2011]

- At 4:13 pm on July 30, we started transferring accumulated water at Unit 3 turbine building to Centralized Radiation Waste Treatment Facility. At 7:17 am on August 4, we stopped the transfer.
- At 8:42 am on August 5, we started transferring accumulated water from the basement of Unit 3 turbine building to Centralized Radiation Waste Treatment Facility (Process Main Building). At 4:46 pm on August 15, we stopped the transfer.
- At 8:51 am on August 19, we started transferring accumulated water from the basement of Unit 3 turbine building to Centralized Radiation Waste Treatment Facility (Process Main Building). At 9:28 am on August 21, we stopped the transfer.
- At 9:39 am on August 21, we started transferring accumulated water from the basement of the turbine building of Unit 3 to Miscellaneous Solid Waste Volume Reduction Treatment Building (High temperature incinerator facility). In addition, at 4:15 pm on August 23, we started transferring accumulated water from the basement of the turbine building of Unit 3 to Centralized Radiation Waste Treatment Facility (Process Main Building). At 9:30 am on August 24, we stopped transferring accumulated water from the basement of the turbine building of Unit 3 to Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building). We continue to transfer to the Process Main Building.
- At 9:46 am, August 30, we stopped transfer of accumulated water from the basement of turbine building of unit 3 to Centralized Radiation Waste Treatment Facility (Process Main Building) and at 9:54 am, we started transfer of accumulated water to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 9:11 am on September 8, we stopped transferring accumulated water from the basement, T/B to Misc Solid Waste Volume Reduction Building [High Temperature Incinerator Building], Centralized Radiation Waste Treatment Facility. From 9:30 am, we started transferring accumulated water to Process Main Building, Centralized Radiation Waste Treatment Facility.
- At 9:35 am on September 11, we stopped transferring accumulated water from the basement of turbine building of Unit 3 to Centralized Radiation Waste Treatment Facility (Process Main Building). At 10:00 am, we started transferring the accumulated water to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 9:44 am on September 15, we stopped transfer of the accumulated water from the basement of the turbine building of Unit 3 to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]), and restarted transfer to Centralized Radiation Waste Treatment Facility (Process Main Building).
- At 9:46 am on September 30, we stopped transferring accumulated water from Unit 3 turbine building basement to Centralized Radiation Waste Treatment Facility (Process Main Building). At 10 am on the same day, we resumed the transfer to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- At 10:59 am on October 3, we started transferring accumulated water at the Unit 3 condenser to the basement of the turbine building. It was stopped at 10:22 am on October 9.
- At 1:16 pm on October 12, due to the blocking work of opening section on the basement of Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]), we stopped transferring accumulated water from the basement of

turbine building to High Temperature Incinerator Building. At 2:02 pm on October 13, we restarted transferring.

- At 9:16, we suspended the transfer of accumulated water from the basement of the turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]), due to the suspension of the water treatment facility.
- At 10:00 am October 20, transportation of accumulated water from unit 3 turbine building basement to Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]) was started. At 9:16 am on October 28, we stopped the transfer.
- At 10:11 am on November 2, we started transferring the accumulated water, which had been transferred from Unit 3 turbine building underground to centralized radiation waste treatment facility(Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building]).
- From 9:25 am on November 15 to 9:45 am on November 24, we transferred the accumulated water from the basement of Turbine Building Unit 3 to Centralized Radiation Waste Treatment Facility (Process Main Building).
- For the reliability enhancement of water injection into reactor, plan to construct water injection facility into reactor of unit 1 to 3 by using condensed water storage tank is under consideration, prior to this plan, at 10:22 am on November 21, we started transfer of water in the condensed water storage tank of unit 3 to under ground of turbine building of unit 3. At 9:45 on November 24, we finished the transfer As the calibration of water level gauge is required if all the water is transferred, approx. 200 ton was left in the tank. During the measurement of salt concentration in the left water, it turned out that concentration was high. In order to secure the space for additional water injection to decrease such concentration, at 10:00 am on December 6, the left water was transferred from the tank to the basement of the turbine building of Unit 3. At 8:54 am on December 7, we stopped transferring. At 9:19 am on the same day we started feeding water to the tank. Then we discovered that there was a leak of water (approx. 5l) from the connecting part of the hose and the tank. At 9:52 am we stopped water transfer and confirmed that the leak stopped. The leaked water was after absorption of radioactive substances and desalination. After that, we finished changing the hose. From 9:05 am on December 9, we started feeding water. At 9:25 on the same day, we finished checking the water feeding line for water leakage. At 7:00 pm on the same day, we finished the filling. At 9:30 am on December 12, we started transferring of the accumulated water in the condensate storage tank of Unit 3 to the basement of Turbine Building of Unit 3 before feeding water to reduce salt level in the tank. After that we confirmed decrease of transferring quantity of water from the water level fluctuation, at 0:00 pm on December 14, we stopped transferring of the accumulated water in the tank. Also we confirmed that there was no water leakage at the site. Currently we are investigating the cause. At 0:30 pm on the same day we flushed the pipe and started the system. Then, as we have confirmed the system was operating normally, we presume the cause is stuck of dust in the pipe. At 4:00 pm on December 16, we stopped it.
- At 2:22 pm on December 15, we started transferring accumulated water from the basement of Unit 3 turbine building to Centralized Radiation Waste Facility (Process Main Building). At 10:04 am on December 17, we stopped it.
- At 2:35 pm on December 24, we started transferring accumulated water from the basement of turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 9:50 am on December 26, we stopped it.
- At 3:32 pm on December 28, we started to transfer accumulated water from the basement of turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 9:03 am on December 29, we stopped transfer.
- At 2:37 pm on December 30, we started the transfer of the accumulated water from the basement of turbine building of Unit 3 to the Centralized Radiation Waste

Treatment Facility (the Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 9:58 am on December 31, we stopped the transfer.

[Year 2012]

- At 10:01 am on January 3, 2012, we started to transfer accumulated water from the basement of turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building).
  At 9:31 am on January 8, we stopped the transferring.
- At 9:37 pm on January 8, 2012, we started to transfer accumulated water from the basement of the turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 8:07 am on January 9, we stopped the transferring.
- At 9:55 pm on January 9, 2012, we started to transfer accumulated water from the basement of the turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 8:00 am on January 10, we stopped the transferring.
- At 3:39 pm on January 11, we started transfer of the accumulated water from the basement of the Unit 3 turbine building to the centralized radiation waste treatment facility (the miscellaneous solid waste volume reduction treatment building [the high temperature incinerator building] and the process main building). At 8:07 am on January 12, we stopped the transfer.
- From 10:15 am on January 12 to 0:50 pm on the same day, we transfer water from Unit 3 water storage tank to basement of Unit 2 turbine building.
- At 9:59 am on January 12, we started transferring accumulated water from the basement floor of the turbine building of Unit 3 to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 8:03 am on January 13 we stopped this transfer.
- At 2:54 pm on January 13, we started transferring accumulated water from the basement floor of the turbine building to the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste Volume Reduction Treatment Building [High Temperature Incinerator Building] and the Process Main Building). At 8:11 am on January 14, we stopped the transfer.

<Nitrogen Injection into the Primary Containment Vessel>

[Year 2011]

- From 5:52 am on August 3, in order to replace the nitrogen gas injector device, we stopped nitrogen gas injection into the Primary Containment Vessel of Units 1 to 3. After completion of the replacement, we restarted injection of nitrogen gas at 8:29 am.

※On October 28, after regular operation of the gas control system for PCV, Unit 2, since a relatively high density hydrogen was detected on October 29, we are intending to control the hydrogen density below the inflammable limit (4%) even if there is no steam, by directly including nitrogen into the RPV for Units 1 to 3.
Until we have included nitrogen into RPV, in order to lower the hydrogen density of RPV by increasing the temperature and the steam ratio thereby, on November 24, we lowered the amount of water injection into the reactor of Units 1 to 3.

- Unit 3:At 7:09, as the amount of nitrogen included was smaller than that of Units 1 and 2, the amount increased from 14 m^3/h to 28.5 m^3/h.
- In order to construct the nitrogen injection line direct to the reactor branched by the nitrogen injection line into the primary containment vessel of Unit 3, at 11:33 am on November 30, we temporarily stopped Nitrogen injection into the primary containment vessel. Then, we restarted Nitrogen injection into the primary containment vessel. At 1:20 pm on the same day, we confirmed the nitrogen injection amount (28m^3/h) into the primary containment vessel was stable. At 4:26 pm, we started operation to inject nitrogen into the reactor pressure vessel. At 4:40 pm, injection amount reached the scheduled amount of 5 m^3/h.

- At 10:25 am on 5 December we started increasing nitrogen injection to the reactor , from which we started on 30 November from approx. $5Nm^3/h$ to $10Nm^3/h$, due to stabilized parameters of the facilities of the power plants such as the Reactor Pressure Vessel and the Primary Containment Vessel.

[Year 2012]

<Others>

[Year 2011]

- From 9:00 am to 12:35 pm on August 24, we conducted dust sampling at the upper part of Reactor Building of Unit 3 using a large crane vehicle.
- From 8:05 am to 9:35 am on September 12, we conducted dust sampling at the upper part of Reactor Building of Unit 3 using a large crane vehicle.
- From 2:13 pm to 3:47 pm on October 6, we conducted dust sampling at the upper part of Reactor Building of Unit 3 using a large crane vehicle.
- From 1:45 pm to 3:17 pm on October 11, we conducted dust sampling at the upper part of Reactor Building of Unit 3 using a large crane vehicle.
- From 8:41 am to 10:08 am on October 12, we conducted dust sampling at the upper part of Reactor Building of Unit 3 using a large crane vehicle.
- At 1:30 pm on October 27, we started injection of hydrazine to spent fuel pool of Unit 3 through the circulating cooling system. At 3:08 pm on the same day, we stopped injection of hydrazine.
- From 11:25 am to 2:00 pm on November 5, we implemented dust sampling at the upper part of the Reactor Building of Unit 3 by using the large crane.
- At 3:05 pm on November 8, for the purpose of switching off accumulated water transfer pump of unit 3 for enhancement work of electricity source, transfer of accumulated water of underground of turbine building of unit 3 to centralized radiation waste treatment facility (miscellaneous solid waste volume reduction treatment facility (high temperature incinerator building) was stopped.
- From 9:22 am to 12:55 pm on November 9, we implemented dust sampling at the upper part of the Reactor Building of Unit 3 by using the large crane.
- From 9:05 am to 1:30 pm on November 10, we conducted a dust sampling top of unit 3 reactor building by using the large crane.
- From 1:10 pm to 2:49 pm on November 10, we conducted injection of hydrazine to spent fuel pool of Unit 3 through the circulating cooling system.
- At 9:24 am on November 29, we started sampling of dusts at the upper part of reactor building of unit 3 using a large crane vehicle. At 1:00 pm on the same date, we finished the sampling.
- At 12:30 pm on November 29, we started dust sampling by using a robot near the opening section for equipment hatch and truck bay door of Unit 1 Reactor building. At 1:00 pm on the same date, we finished the sampling.
- At 9:00 am on November 30, we started dust sampling above the reactor building of Unit 3 with a large crane. At 12:30 pm on the same day, we finished the sampling.
- At 10:00 am on November 30, we started dust sampling by a robot near the equipment hatch of ground floor, reactor building unit 3. At 10:30 am on the same day, we finished sampling.
- At 10:35 am of 5 December, we started dust sampling above the reactor building with a large crane. At 12:05 pm we finished this.
- At 9:00 am on December 10, we started dust sampling above the reactor building of Unit 3 with a large crane. At 10:30 am on the same day, we finished the sampling. At 3:15 pm on the same day, the hydrazine injection was completed.

[Year 2012]

- At 9:15 am on January 6, 2012, we started dust sampling by large size crane at upper part of the reactor building of Unit 3. At 12:30 pm, the dust sampling was finished.

【Unit 4】

<Alternative cooling of spent fuel pool>

[Year 2011]

- At approximately 11:20 am on August 11, as we found a little water leakage in the primary hose of the circulating cooling equipment for the spent fuel pool in the centralized radiation waste treatment facility of Unit 4, we covered and reinforced the leakage part with plastic. We are planning to replace the hose, etc. We have been continuing circulating cooling of the spent fuel pool.

- At 3:22 am on August 12, an M 6.0 earthquake with the seismic center at offshore of Fukushima prefecture occurred. At 5:27 am on the same day, we found very small volume of water leakage from a hose, primary system, alternative Spent Fuel Pool cooling system located in the radioactive waste treatment building, Unit 4. We are planning to replace the hose.
- As a countermeasure against slight water leakage from the primary hose of the alternative cooling apparatus for the spent fuel pool, we stopped the alternative cooling apparatus in order to exchange the hose at 7:58 pm on August 17. At 3:00 pm on the same day, we resumed operation of the system.
- At approximately 12:30 pm August 23, small amounts of water was found leaking from a flexible hose connected to the primary system of the alternative cooling and filtering system of the Spent Fuel Pool at the Waste Treatment Building of Unit 4. Actions to repair the leakage point were taken and alternative cooling for the Spent Fuel Pool conducted continuously.
- Around 1:00 pm on September 21, small amounts of water was found leaking from a flexible hose connected to the primary system of the alternative cooling and filtering system of the Spent Fuel Pool at the Waste Treatment Building of Unit 4. Actions to repair the leakage point were taken and alternative cooling for the Spent Fuel Pool is being conducted continuously.
- At 2:58 pm on November 17, an alarm of Unit 4 spent fuel pool circulating cooling system was sounded, and the system automatically shut down. After that we confirmed the stop occurred due to error alarm of leakage at heat exchange unit. At 3:58 pm on the same day, we confirmed no leakage occurred, and we restarted the system 4:12 pm. At 10:07 am on December 13, in order to conduct the flow meter inspection for the spent fuel pool alternative cooling system in Unit 4, the system was suspended (Water temperature at the time of suspension: 23℃). At 11:30 am, the cooling was resumed by restarting the system (Water temperature at the time of resume: 23℃).

[Year 2012]

- At approx. 5:30 pm on January 1, 2012, we observed approx. 240 mm decrease in the water level of the skimmer surge tank*1 of Unit 4 spent fuel pool in the three hours between 2:00 pm to 5:00 pm (According to the operation record so far, there had been an approx. 50 mm decrease.). As a result of the site investigation later, we did not observe any leakage around the Unit 4 reactor building, connecting points of primary system pipes of Unit 4 spent fuel pool alternative cooling system, or its installation space. The water temperature of Unit 4 spent fuel pool as of 5:00 pm on January 1 is 23℃ (22℃ as of 5:00 am on January 2). The spent fuel pool alternative cooling system is still in operation and there is no problem in cooling the reactor. Though the water level of the spent fuel pool is kept stable without any problem, the water level in the skimmer surge tank continues decreasing. Therefore, from 10:27 pm to 11:13 pm on January 1, we filled water in the skimmer surge tank. At present, the water level in the skimmer surge tank keeps decreasing approx. 90mm/hour. We will strengthen surveillance on observation of the water level in the skimmer surge tank, increasing the frequency to once in an hour from once in three hours.

  At present, no leakage is observed outside the building. No significant change is observed in the water level of the accumulated water in the building.

  By further investigation, we confirmed that amount of water that is equivalent to decreased water level of the skimmer surge tank and amount of water that is equivalent to increased water level of the reactor well*2 are almost the same and the water level at reactor well is lower than that of the spent fuel pool. With these facts, we estimate that situation of gate between the reactor well and the spent fuel pool changed and water flow from the spent fuel pool to the reactor well increased made decrease in water flow from the spent fuel pool to the skimmer surge tank, and so decrease in water level at the skimmer surge tank was more than usual. To decrease the difference between the water level of the reactor well and that of the spent fuel pool, we put water into the reactor well from 11:50 am to 11:59 am on January 2. As of 4:00 pm, we can not find decrease in the water level of the skimmer surge tank. We will continue surveillance the water level of the skimmer tank.

*1 The tank installed in order to receive the water overflows from the spent fuel pool. The water in the spent fuel pool is overflowed into the skimmer surge tank in order to cool the fuel assembly and remove impurities in the water. The water returns to the spent fuel pool after passing through the heat exchanger and the filter.

*2 The reactor well is the space which contains the reactor pressure vessel and the lid of the reactor containment vessel. During the periodical inspections, the space filled with water and the fuel is changed.

<Desalting water in Spent Fuel Pool>

[Year 2011]

- As we confirmed that there was no problem with the desalting facility for the spent fuel pool of Unit 4 through a trial operation at 10:24 am on August 20, at 11:34 am on the same day we started to operate it fully.
- At 10:34 am on August 22, a water-level alarm of condensed waste tanks was generated and the desalination facility stopped. After confirming no leakage, we restarted its service at 6:25 pm on the same day.
- At 9:47 am on September 14, we stopped the Spent Fuel Pool's desalination system of Unit 4 to install an electric dialysis equipment. At 0:25 pm on the same day, the desalination system resumed while we continued operation of an alternative system to cool down the pool.
- At 8:54 am on October 3, the secondary cooling system piping arrangement of circulating cooling system of Unit 4 spent fuel pool was stopped due to the replacement of the secondary cooling system piping arrangement. After completing the replacement, the secondary cooling system was restarted at 3:03 pm on the same day.
- At 12:25 am on November 8, RO membrane unit of desalting facility in spent fuel pool, Unit 4 automatically stopped due to the alarm indicating leakage. Responding to the alarm, we confirmed that all the isolation valves of each unit were closed by the interlocks. Also, considering that all the spots at leakage risk were equipped with receiving pans which would be able to store all of the liquid in the unit, we judged that further deterioration of leakage or leakage to outside of the unit was unlikely. We will check the site and situation in the future. The operation of circulating cooling system has been continued. Afterwards, as the result of confirmation at the site of this facility, we confirmed that the leakage have stopped, all of the leaked liquid is in the receiving pans (approx. 5 liter), and there exists a trail of leakage from the pump casing of RO membrane unit. At 2:00 pm on the same day, we wiped out the leaked liquid and reset the alarm. We will investigate in detail.
- Regarding spent fuel pool for unit 4, from August 20 to November 8, we had decreased salinity by using the desalting facility. In order to decrease more salinity, we installed Ion exchange equipment and started the equipment at 10:58 am on November 29.

[Year 2012]

<Others>

[Year 2011]

- At 1:01 pm on October 20, we started injection of hydrazine to the spent fuel pool of Unit 4. At 2:41 pm on the same day, we completed the injection.

[Year 2012]

- Around 1:00 pm on January 8, at circulating cooling system for spent fuel pool of unit 4, we found water leakage from 4 points of cooling pipe of air fin cooler (System B) when we tried to conduct scheduled switching of air fin cooler (From System A to System B). Currently, we are investigating the cause of the leakage. Leaked water is purified water (pure water)* and is not contained radioactive materials. Now we secluded the air fin cooler from the system to prevent the spread of water leakage. In addition, the cooling of spent fuel pool has no problem because we are currently using air fin cooler (System A) to cool spent fuel pool.

* Purified water (pure water): The water from Sakashita dam

【Unit 5】

<Treatment of Accumulated Water>

[Year 2011]

- From 2:06 pm on October 7, in order to prevent from spontaneous combustion of cut trees and dust dispersing we started to sprinkle water in the site of Fukushima Daiichi Nuclear Power Station with cleared-up accumulated water of Unit 5 and 6. We measured radioactivity density in advance and confirmed to meet requirement of the guideline suggested in “Guideline regarding radioactive materials on bathing area”.

[Year 2012]

<Others>

[Year 2011]

- From 10:03 am to 10:43 am on August 8, we stopped the residual heat removal system pump (D) in order to switch the power source of the pump (C) as well as conducting its commissioning (C)
- In order to repair the outlet valve of Unit 5 residual heat removal system seawater pump (D), from 9:45 am to 10:42 am, September 26, we switched the seawater pump from B system (permanently installed) to A system (temporarily installed).
- At 11:05 am on September 27, on the second floor of the turbine building of Unit 5, while draining lubricant oil of overhead crane to drums for inspection of the crane, one of our employees found lubricant oil was leaked on the floor. The amount of the leaked oil was approximately 8 liters, and at about 1:00 pm, we wiped the oil from the floor.
- On September 30, as the repair work for the outlet valve of Unit 5 Residual Heat Removal System Sea Water Pump completed, between 11:30 am and 11:34 am on the same day, the Residual Heat Removal System was switched from A system to B (the Residual Heat Removal System Sea Water Line was also switched from A system to B).
- For the purpose of Unit 5 water intake inspection, at 9:05 am October 20, unit 5 seawater pump of Equipment Water Cooing System was shutdown, and stopped cooling the spent fuel pool. At 9:13 am, Residual Heat Removal System (D) was stopped and stopped cooling the reactor. As the inspection was completed, at 2:32 pm, seawater pumps of Equipment Water Cooing System was resumed, which resumed cooling the spent fuel pool. At 3:02 pm, Residual Heat Removal System (D) was resumed, which resumed cooling the reactor. Due to this stop, reactor water temperature temporarily rose from 22.2℃ to 31.1℃. Spent fuel pool water temperature temporarily rose from 25.5℃ to 26.2℃.
- For the purpose of the cleaning starting on November 28 to avoid the performance deterioration of pumps by sucking up sands etc. accumulated at the bottom of the inlet canal pump room, we stopped the pump (D) of the residual heat removal system thus suspended cooling the reactor, and also stopped the pump (C) of the cooling water system thus suspended cooling the spent fuel pool. When each pump was stopped, the temperatures of the water in the reactor and the spent fuel pool were 25.7℃ and 20.4℃ respectively. The planned suspension of cooling is between 7:00 am to 5:00 pm everyday, and the temperature increases of the water in the reactor and the spent fuel pool due to the suspension will be approx. 17℃ and approx. 4℃ per day respectively (we plan to do the cleaning work for approx. 1 week).
- On December 6, after the completion of such cleaning work, at 2:06 pm, we reactivated the pump (C) of the cooling water system in Unit 5 in order to restart the cooling of the spent fuel pool.(The temperature of the spent fuel pool was 23.3℃). At 2:24 pm, we reactivated the pump (D) of the residual heat removal system in Unit 5 in order to restart the cooling of the spent fuel pool.(The temperature of the spent

fuel pool was 35℃).

- Due to the reconstruction work of the residual heat removal system sea water pump (B) of Unit 5, which had been out of order after the Tsunami, from 6:29 am on December 14, we stopped cooling the reactor of Unit 5 by suspending the operation of the residual heat removal system pump (B) and the residual heat removal system pump (D). After completion of the work, we started the suspended pumps, and at 4:29 pm on the same day, we restarted cooling the reactor. (The temperature of the reactor core at the time of suspension was 26.5 ^{o}C and the temperature at the time of restart was 38.2 ^{o}C)
- At 9:55 am on December 20, as a restoration work for Unit 5 residual heat removal seawater system pump (B) was completed, we started a test operation, and at 11:22 am, a full-scale operation started after we confirmed its soundness. As a result, there came two (2) pumps, or (B) and (D). Although we stopped cooling down the reactor of Unit 5 by pausing the pump (B) from 9:39 am to 10:11 am, the reactor water temperature increase was 0.1℃ and we made sure there was no security issues.
- At 11:28 am on December 21, trial operation was conducted for Unit 5 residual heat removal system pump (A) which has been stopped due to the tsunami on March 11. Because its soundness was confirmed, it was resumed to be on stand-by at 12:49 pm. Reactor cooling was temporarily suspended while switching pumps in trial operation, but there is no problem regarding the cooling.
- At 10:11 am on December 22, since we finished the recovery work of seawater pump (System B) of equipment water cooling system of Unit 5, we made a trial run. At 11:25 am on the same day, we confirmed no abnormalities and restarted the operation.

[Year 2012]

- At 2:39 pm on January 11, to protect the decline of facilities which are needed to maintain the stable cold shutdown and improve the high-humidity environment in the Reactor Building of Unit 5, we started up ventilation and air-conditioning system in the building. This air conditioning system inlet and outlet air by high-efficiency particle filter. The air out of the conditioning system has been emitted through high-performance particle filter installed at the intake and exhaust side. On January 13, we conducted the nuclide analysis on the samples collected at exhaust stack of Unit 5 and 6. As a result, no radioactive materials were detected.

【Unit 6】

< Treatment of Accumulated Water>

[Year 2011]

- Following start of transferring of low radioactive accumulated water from temporary tank to Mega Float, we restarted the transferring of accumulated water at the underground of Unit 6 turbine building to temporary tank, as shown below.

  From 11:00 am to 4:00 pm on August 2
  From 11:00 am to 4:00 pm on August 3
  From 11:00 am to 4:00 pm on August 5
  From 11:00 am to 4:00 pm on August 6
  From 11:00 am to 4:00 pm on August 8
  From 11:00 am on August 9 to 5:00 pm on August 10
  From 10:00 am to 4:00 pm on August 11
  From 10:00 am to 4:00 pm on August 12
  From 11:00 am on August 15 to 9:00 am on August 15
  From 10:00 am to 5:00 pm on August 18
  From 10:00 am to 1:00 pm on August 19
  From 10:00 am on August 23 to 4:00 pm on August 24
  From 10:00 am to 4:00 pm on August 25
  From 10:00 am to 4:00 pm on August 26
  From 10:00 am to 4:00 pm on August 29
  From 10:00 am to 4:00 pm on September 1
  From 11:30 am to 4:00 pm on September 12
  From 10:00 am to 4:00 pm on September 13
  From 10:00 am to 4:00 pm on September 15

From 10:00 am to 4:00 pm on September 20

From 10:00 am to 4:00 pm on September 21

From 10:00 am to 4:00 pm on September 22

From 10:00 am to 4:00 pm on September 24

From 10:00 am to 4:00 pm on September 26

From 10:00 am to 4:00 pm on September 28

From 10:00 am to 4:00 pm on September 29

From 10:00 am to 4:00 pm on September 30

From 10:00 am to 4:00 pm on October 3

From 10:00 am to 4:00 pm on October 5

From 10:00 am to 4:00 pm on October 7

From 10:00 am to 4:00 pm on October 12

From 10:00 am to 4:00 pm on October 14

From 10:00 am to 4:00 pm on October 18

From 10:00 am to 4:00 pm on October 22

From 10:00 am to 4:00 pm on October 26

From 10:00 am to 4:00 pm on October 30

From 10:00 am to 4:00 pm on November 3

From 10:00 am to 4:00 pm on November 6

From 10:00 am to 4:00 pm on November 9

From 10:00 am to 4:00 pm on November 13

From 10:00 am to 4:00 pm on November 17

From 10:00 am to 4:00 pm on November 29.

From 10:00 am on December 1 to 4:00 pm on December 2.

From 10:00 am on December 5 to 4:00 pm on December 6

From 10:00 am on December 8 to 4:00 pm on December 9.

From 10:00 am to 4:00 pm on December 12.

From 10:00 am to 4:00 pm on December 13.

From 10:00 am on December 15 to 4:00 pm on December 16 / From 10:00 am to 4:00 pm on December 26.

- We transferred low level radioactive accumulated water, which had been transferred from the turbine building to the temporary tank, from the temporary tank to Mega Float, as shown below.

  From 10:00 am to 5:00 pm on August 2

  From 10:00 am to 5:00 pm on August 3

  From 10:00 am to 5:00 pm on August 5

  From 10:00 am to 5:00 pm on August 6

  From 10:00 am to 5:00 pm on August 8

  From 10:00 am to 4:00 pm on October 19

  From 2:00 pm to 3:00 pm on October 20

  From 10:00 am to 4:00 pm on October 21

  From 10:00 am to 10:30 am on October 24

  From 10:00 am to 11:30 am on October 25

  From 10:00 am to 4:00 pm on October 27

  From 10:00 am to 4:00 pm on October 28

  From 10:00 am to 4:00 pm on October 31

  From 10:00 am to 4:00 pm on November 1

  From 10:00 am to 3:00 pm on November 2

  From 10:00 am on November 8

- We transferred accumulated water from the basement of Unit 6 reactor building to the turbine building as shown below.

  From 11:05 am to 12:00 pm on September 2

  From 8:30 am to 9:55 pm on September 3

  From 1:20 pm to 2:45 pm on September 8

  From 10:15 am to 11:30 am on September 12

  Transfer from September 13 onwards, will be considered depending on the water level at the building.

- At 10:00 am on August 9, we resumed transferring low-level accumulated water to Mega Float from a temporary tank where we had transferred from the turbine building of Unit 6. At 10:12 am the transfer was suspended, as we confirmed accumulated water was leaking from the transfer hose. At 1:35 pm on the same day, we restarted the transfer after replacing the hose. At 5:00 pm on the same day, we completed the transfer. After that, the results of the transfer are shown below.
  From 5:00 pm on August 13 to 10:00 am on August 14
- From 2:06 pm on October 7, in order to prevent from spontaneous combustion of cut trees and dust dispersing we started to sprinkle water in the site of Fukushima Daiichi Nuclear Power Station with cleared-up accumulated water of Unit 5 and 6. We measured radioactivity density in advance and confirmed to meet requirement of the guideline suggested in "Guideline regarding radioactive materials on bathing area".
- As we observed reduction of flow rate at the residual heat removal seawater system pump (C) of Unit 6, At 10:32 am on December 9, we stopped cooling the Reactor by the residual heat removal system (A) and stopped the residual heat removal seawater system pump (C). After that, we restarted the residual heat removal seawater system pump (C) and confirmed that the performance of that pump returned to almost normal level. At 11:18 am on the same day, we resumed cooling the Reactor by the residual heat removal system (A). With this stop, Reactor water temperature temporarily increased from 26.6 Celsius to 27.5 Celsius.

[Year 2012]

- We transferred accumulated water from the basement of turbine building of Unit 6 to temporary tank.
  From 10:00 am to 4:00 pm on January 4/ from 10:00 am to 4:00 pm on January 8.

<Others>

[Year 2011]

- At 9:27 am on August 9, as we conducted plumbing connection work to Unit 6 residual heat removal seawater system (System A), we stopped the power source of residual heat removal seawater system (System B) and cooling of the reactor and the spent fuel pool was temporarily suspended. At 2:01 pm on the same day, we completed the work and restarted cooling the reactor and the spent fuel pool by the residual heat removal seawater system (System B).
- From 9:55 am to 12:39 pm on September 8, in order to fill Residual Heat Removal System seawater system cooling pump (A) of Unit 6, we stopped Residual Heat Removal System (B). With this, cooling of Reactor and Spent Fuel Pool were also temporarily suspended
- At 2:29 pm on September 10, we stopped the residual heat removal system (B) of Unit 6. At 3:12 pm we started (A) of the same system. (Cooling of the spent fuel pool was temporarily suspended, however, there was no change in the water temperature in the pool before and after the suspension.) The water in the reactor and in the spent fuel pool will be alternately cooled by the residual heat removal system (A).
- At 9:56 am on September 15, we restored and restarted the seawater pump of Equipment Cooling Water System of Unit 6. At 2:33 pm on the same day, we completed the adjustment of the flow rate of Fuel Pool Cooling System and started cooling the spent fuel pool. Consequently, the reactor and the spent fuel pool are now separately cooled through Residual Heat Removal System and Fuel Pool Cooling System respectively.
- At 11:05 am on September 27, on the second floor of the turbine building of Unit 5, while draining lubricant oil of overhead crane to drums for inspection of the crane, one of our employees found lubricant oil was leaked on the floor. The amount of the leaked oil was approximately 8 liters, and at about 1:00 pm, we wiped the oil from the floor.
- Because a decrease in the amount of water was confirmed at the residual heat removal system seawater pump (C), the cooling of the reactor using residual heat removal system (A) was stopped at 11:20 am on October 3, and we implemented the inspection of the residual heat removal system seawater pump (C) and the related system. The inspection result confirmed its normal function. Thus, at 12:44 pm on the same day, we resumed cooling the reactor by residual heat removal

system (A).

- At 1:41 pm October 6, We stopped pumping at auxiliary cooling seawater system Unit 6 since we found slow decreasing trend in pressure of pump header at that system. At 2:07 pm October 6, we restarted the pump and confirmed that the pressure was normal value.
- As confirming downward tendency on flow rate at Residual Heat Removal system sea water pump (C) of Unit 6, we stopped cooling reactor by Residual Heat Removing system (A) and conducted check-out the pump and related system at 11:55 am on October 7. The result of check-out , we confirmed no abnormalities and restarted cooling reactor with Residual Heat Removal system (A) at 12:41 pm on the same day.
- At 9:42 am on October 13, we stopped the residual heat removal system (A) in order to check operation of residual heat removal system temporary pump (B) of Unit 6. We started the residual heat removal system (B) at 9:54 am on the same day. After completion of the check, we stopped the residual heat removal system (B) at 10:07 am, and restarted residual heat removal system (A) at 10:17 am.
- Because a decrease in the amount of water was confirmed at the residual heat removal system seawater pump (C) of Unit 6, the cooling of the reactor using residual heat removal system (A) was stopped at 2:42 pm on October 14, and after that we stopped the residual heat removal system seawater pump (C). Later on, we restarted the residual heat removal system seawater pump (C) and confirmed that it returned to a predetermined performance. Thus, we restarted to cool the reactor using residual heat removal system (A) at 3:23 pm on the same day. Due to this suspension, the water temperature of the reactor temporarily rose to 23.3℃ from 22.6℃.
- At 2:30 pm on October 19, we stopped seawater line pump of residual heat removal system (C) after stopped cooling reactor by residual heat system (A) due to the downward trend on the flow rate and pressure of the Unit 6 residual heat removal system. After that we restarted sea water pump of residual heat removal system (C) and as we confirmed the related pump returned to running at specified performance, we restarted cooling reactor by residual heat removing system (A) at 3:02 pm on the same day. The temperature of the reactor water is rose 21.6 deg C to 22.1 deg C temporarily by this suspension.
- For the purpose of Unit 6 water intake inspection, at 9:05 am October 21, unit 6 seawater pump of Equipment Water Cooing System was shutdown, and stopped cooling the spent fuel pool. At 9:13 am, Residual Heat Removal System (A) was stopped and stopped cooling the reactor. After the inspection was finished, the cooling for the reactor was resumed by restarting the pump of Residual Heat Removal System (A). At 4:01 pm, the cooling for spent fuel pool was resumed by restarting the seawater pump of Equipment Water Cooling System. As a result of this interruption, the water temperature in the reactor increased temporarily from 24℃ to 32.1℃. The water temperature for the spent fuel pool increased temporarily from 25℃ to 26.5℃
- From November 15, due to cleanup work in order to prevent performance deterioration of pump caused by inletting sand or other materials piled up at the bottom of pump room of intake channel of Unit 6, Residual Heat Removal System (A) was shutdown, and stopped cooling the reactor. And Seawater pump of Equipment Water Cooing System (A) was shutdown, and stopped cooling the spent fuel pool. The stop is scheduled from 7:00 am to 5:00 pm everyday, reactor water temperature will rise by approx. 12℃ per day, and spent fuel pool water temperature will rise by approx. 3℃ per day. (The cleanup work is planned to be finished in a week.) On November 23, we finished all of this clean up work and at around 5:00 pm on the same day. When we restarted the pump of auxiliary cooling sea water system (A) which stopped due to the work, it shut down automatically right after it was restarted. Currently the cause is under investigation. Reactor water and Spent Fuel Pool are planned to be cooled alternatively by pump of residual heat removal system (A) until the pump is recovered. At 10:23 am on November 24, we suspended cooling reactor water. At 10:41 on the same day, we started to cool spent fuel pool. (water temperature at the time of switching: reactor 26.4℃, spent fuel pool approx. 30℃). On November 24, as a result of checkups of the pump except for the power panel switchgear that we are unable to check without overhauling, since we identified no abnormality, the

pump resumed at 4:19 pm after a workout to resume by replacing the power panel switchgear. After that at 4:35 pm, as there was no abnormality we resumed cooling down the Spent Fuel Pool water by using the pump (SFP water temperature: 23.5 ℃ at the time of resumption). Since 10:23 on November 24, as for the water residual heat removal system (A) pump that has been shutdown to cool down the water of nuclear reactor, we, by changing method, resumed operation. (nuclear reactor water temperature: 33.4 ℃ at the time of resumption).

- Due to the completion of restoration of residual heat recovery (RHR) sea water pump (A) of unit 6, which was not be able to use by the affect of tsunami, at 10:19 am on December 27, commissioning was started, at 11:30 am as no incident was observed, it returned to usual operation. As a result, two RHR pumps, (A) and (C), had been returned to service. During the commissioning, while RHR pump (A) of unit 6 was temporary stopped from 10:01 am to 11:09 am and cooling of reactor core was suspended, as the increase of core water was approx. 0.7℃ and there were no concerns to the safety.

[Year 2012]

- At 4:20 pm on January 11, we activated the air ventilation/conditioning system of the Unit 6 turbine building in order to avoid degradation of the facilities to maintain the cold shutdown in the reactor buildings, and in order to improve the high-humidity environment in the reactor building. The air out of the conditioning system has been emitted through high-performance particle filter installed at the intake and exhaust side. On January 13, we conducted the nuclide analysis on the samples collected at exhaust stack of Unit 5 and 6. As a result, no radioactive materials were detected.

【Others】

<Detection of radioactive materials>

[Soil]

[Year 2011]

- Plutonium was detected in the soil sampled on August 1, 8, 15, September 5, 12, 19, 26 October 3, 10, 17, 24, 31, November 7, 14, 28 and December 5, 12 and 19 in the site of the Power Station. In addition, as a result of nuclide analysis of the gamma ray contained in the soil, radioactive materials were detected.
  Strontium 89 and 90 were detected as a result of analysis conducted on strontium contained in the soil sampled on August 15, September 12, October 10, December 12 and 26 in the site of the Power Station.

[Year 2012]

[Air]

[Year 2011]

- We detected radioactive materials in the air collected at the site of Fukushima Daiichi Nuclear Power Station on August 2, 3, 4, 6, 8 to 10, 12, 14, 15, 17, 18, 21, 23, 25, 31 and September 1, 5, 7, 8, 9, 10, 12, 13, 14, 15 ,21, 22, 24, 25, 27, 28 ,29, 30, October 3, 7,10, 11, 13, 14, 16, 18, 22, 25, 26, 27, November 1, 2, 9, 10, 11, 12, 14, 15, 16, 17, 24, 25, 26, 27,28, December 14, 15, 22, 27, 28 and 29. 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 1.
- At 2:30 pm on August 18, we confirmed the instrument reading of transportable monitoring post that was measuring dose rate of main gate of the power station became unreadable. The data transfer was resumed at 4:00 pm on the same day.
- At approximately 10:00 am on September 12, we confirmed the instrument reading of transportable monitoring post that was measuring dose rate of main gate of the power station became unreadable. The data transfer was resumed at 10:30 am on the same day.
- From around at 5:48 pm on December 3, data of monitoring post No.8, monitoring dosage rate at the power station, found disappeared. As the reason was not found and the post was not be able to recovered, an alternative monitoring by monitoring post No.7 and a dose rate meter having additionally monitored around monitoring post No, 8 (which was set to monitor corresponding to nitrogen injection to RPV)

was conducted, and the most recent data was not changed from that of the day before (The monitoring post No.7: 92 μ Sv /hour, around the monitoring post No. 8: 42 μ Sv /hour (as of 8:00 pm)). The monitoring post No.8 will be maintained hereafter.

- On December 6, the display function of No. 8 monitoring post was retrieved when its board was reinserted. Thereafter, we have restarted the measurement with No. 8 monitoring post as no sign of reoccurrence was confirmed.
- At 0:20 pm on December 6, it was confirmed that the measurement data for 0:00 pm in the monitoring post set at the main gate was missing. The data for 1:00 pm, 1:30 pm, and 2:00 pm were manually measured at the location and the measured data was in the same level as the data before 0:00 pm. Thereafter, we have removed the water accumulated in the cable connector portion of the monitoring post and restarted the measurement by the monitoring post at 2:30 pm.
- At approxi.11:30 am on December 13, we have confirmed that the 11:30 data was not collected from the transportable monitoring post installed at the west gate. Later, we have found out that disconnection of the cables was the cause for this communication error. Therefore, we reconnected the cables and resumed the measurement the transportable monitoring post. As for the data on 12:00 pm, 12:30 pm and 1:00 pm, we actually went to the site to conduct the radiation measurement and confirmed the result to be equivalent to the data collected prior to the disconnection of the cables (approx. 11 μ Sv/h).
- At 10:00 am on December 22, we started to replace the transmission parts of monitoring post No.2 and No.8 which monitor dose rate inside the site. At 11:40 on the same date, we finished the replacement work. In addition, monitoring post No.8 data was unavailable from 11:10 am to 11:40 am, but we confirmed that the other monitoring posts didn't indicate unusual values. Monitoring post No.2 was available during the replacement work due to the replacement parts are different from Monitoring post No.8.

[Year 2012]

We detected radioactive materials in the data collected on January 2, 5, 6, 10 11,12 and 13,2012 in the air inside the site.

[Water]

[Year 2011]

- We detected radioactive materials contained in the sea water near the power station collected on August 1 to 3, 5, 8 to 9, 11, 17 to 19, 21, 30, September 13, 14, 23, 28 ,29, 30, October 16 20 22, 24 25, 26, 27, 28, 29, 30, 31, November 1, 2, 3, 4, 5, 6, 7, 9, 10,11,12, 13, 14 , 15, 16,17, 18, 19, 20, 21 22, 23, 24, 25, 26, 27,28, 29, 30, December 1, 2, 3, 4, 5, 6, 7,9, 10, 11, 12, 13, 14, 15, 16, 17,18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30, 31.
- 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 1.

  Strontium 89 and 90 were detected as a result of analysis conducted on strontium contained in the seawater sampled on August 15, September 12, October 10 and November 14 near the Power Station.
- On September 28, relating to the water seal work at the southern part of Unit 1 to 4 open water channel, we completed countermeasures against contaminated water outflow and diffusion by using steal sheet piles at the points.
- On October 28, we started the installation work of the water shielding wall at the seaside in front of the existing seawalls of Units 1 to 4, with the expectation of preventing further contamination in the ocean via grounder water.
- We detected radioactive materials in the sampling of sub-drain water near the turbine building conducted on August 1, 3, 5, 8, 10, 12, 15, 17, 19, 22, 24, 26, 29, 31, September 2, 5, 7, 9, 12, 14, 16, 19, 21, 23, 26 ,29, 30, October 3, 5 , 7, 10 12, 14,17,19, 21 24, 26, 28, 31, November 2, 4, 7, 9, 14, 16, 18, 19, 21, 23, 25, 28 , 30, December 2, 5, 7, 9, 12 ,14,16 19, 21, 23, 26, 28 and 30.

  Strontium 89 and 90 were detected as a result of analysis conducted on strontium contained in the sub-drain water sampled on August 15, September 12, October 10 and 11, November 14, and December 12.

There were positive findings as a result of analysis conducted on tritium and all beta materials contained in the sub-drain water sampled on September 12.

There were positive findings as a result of analysis conducted on tritium. All alpha and all beta materials contained in the sub-drain water sampled on October 10.

There were positive findings as a result of analysis conducted on tritium, all alpha and all beta materials contained in the sub-drain water sampled on November 14.

There were positive findings as a result of analysis conducted on tritium, all alpha and all beta materials contained in the sub-drain water sampled on December 12.

[Year 2012]

- We detected radioactive materials in the sampling of close sea area of power station conducted on January 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13.
- On January 2, 4, 6, 9, 11, 12 and 13, we detected radioactive materials in the sampling of sub drain near the turbine building.

[Marine soil]

[Year 2011]

- Cs-134 and Cs-137 were detected through a nuclide analysis in the marine soil sampled on August 6, 7, 8, 10, 23 and September 8, 9, 12, 14, 15, 16, 25 to 28 and October 7, 10, 11, 12, 13, 14, 17 and November 7, 9, 10, 11, 14, 18, 21, 22, 25 and December 5, 10, 11, 12, 13, 14, 15 and 16 in Fukushima Prefecture offshore. Plutonium and Uranium were detected in the marine soil sampled on September 8, 9, 13, and 25. Strontium was detected in the marine soil sampled on September 12, 13 and 15. Americium was detected in the marine soil sampled on September 8, 9, 12, 13, 15 and 25.

[Year 2012]

-Cs-134 and Cs-137 were detected through a nuclide analysis in the marine soil sampled on January 5 and 7.

<Accumulated water treatment facility>

[Year 2011]

- At 5:32 am on August 4, we stopped operation of the water treatment facility in order to improve the flow rate. After the work to improve the flow rate, we started water treatment facility at 3:30 pm on the same day and started water treatment at 4:13 pm.
- At 6:55 pm on August 4, decontamination facility automatically stopped due to the stop of chemical injection pumps for ultra-high speed coagulation sedimentation facility and we stopped water treatment facility. We checked the soundness of the stopped pumps and started water treatment facility at 8:30 pm, and water treatment at 8:50 pm on the same day.
- At 2:12 am on August 5, a process error alarm was generated and we stopped the water treatment facility. We started the water treatment facility at 4:03 am and water treatment at 4:21 am on the same day.
- Around 7:00 pm on August 4, leakage was found from the flange of the hoses to transfer filtrate water which has been used for salt cleansing in the replacement vessel of cesium adsorption facility at On-site Bunker Building. New transfer hoss are installed between cleansing facility to Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building).
- At 6:20 am on August 6, we stopped the water desalination facility and started inspection of the level switch of water tank of the water desalination facility from 8:30 am. We finished the inspection at 2:20 pm, and restarted the water desalination facility at 2:30 pm.
- At 8:07 am on August 7, water treatment facility has stopped as decontamination instrument has automatically stopped due to the trip of chemical injection pump of high speed coagulant facility. At 3:31 pm on the same day, operation for water treatment facility was resumed. After stroke adjustment for chemical injection pump (diaphragm type) was conducted to prevent motors from being overloaded, at 4:54 pm on the same day, we resumed water treatment.
- At 4:11 pm on August 7, we completed commissioning of additional two evaporative

concentration apparatuses to the water treatment facility to make freshwater from condensed seawater from desalination facility. We put those additional facilities to full-scale operation.

- At 8:20 pm on August 8, Water Treatment Facility has stopped due to the water level gauge's error alarm of SPT tank. Subsequently, we confirmed no problems with Water Treatment Facility and the facility has started at 10:22 pm on the same day and resumed operation at 10:45 pm.
- Since SPT waste liquid pump and SPT receiving water transfer pump stopped due to power lost of water glass of SPT tank, an alarm showed low level of water at waste RO supply tank at 1:50 am on August 9 and water desalinations automatically stopped. At 6:57 am, water glass of SPT tank recovered. At 9:35 am on the same day, water desalinations restated as the water level at waste RO supply tank recovered.
- At 12:25 pm on August 11, water treatment facility stopped after a process error alarm was generated due to the water level of the decontamination instrument tank beyond the range measurable by the water level indicator. Later we judged it was a malfunction of the indicator since there was no abnormality such as the leakage. We reactivated it at 12:40 pm using another existing indicator, and then at 12:58 pm resumed the operation of the water treatment.
- At approximately 3:22 am on August 12, an M 6.0 earthquake with the seismic center at offshore of Fukushima prefecture occurred. The boiler for the evaporative concentration apparatus in the water treatment facility stopped. At 3:42 am on the same day, we restarted the boiler and resumed the apparatus
- At 6:17 pm on August 12, a process error alarm was generated in decontamination instruments and water treatment facility was stopped. At 10:59 pm on the same day, we restarted the facility, as we had not found any abnormality of it and estimated temporary abnormality of their control system. At 11:33 pm on the dame day, we resumed water treatment.
- At 7:11 am on August 13, we manually stopped Evaporative Concentration Apparatus (2B) in water desalination facility, as we found a hose injecting chemical to the evaporative apparatus was detached. We continue operating other apparatuses in the facility. After that, we connected the detached hose, inspected connection points of similar hoses, and at 12:01 pm, we resumed operation of Evaporative Concentration Apparatus (2B).
- At 12:04 pm on August 16, we stopped the operation of the water treatment system and started the trial operation of the second cesium adsorption instruments.
- At 2:43 pm on August 18, we started the operation of the water treatment system, and the treatment of accumulated water with highly concentrated radioactive materials utilizing a combination of cesium adsorption instruments, second cesium adsorption instruments and decontamination instruments. At 3:50 pm on the same day, we confirmed that the flow rate had steadied, the water treatment operation was stable, and that there were no operational problems.
- At 2:00 pm on August 19, we stopped the operation of the water treatment system in order to switch to parallel operation of process line from cesium adsorption instruments to decontamination instruments, and another process line of second cesium adsorption instruments. At 3:44 pm on the same day, we started up the process line from cesium adsorption instruments to decontamination instruments. At 3:54 pm, it was confirmed that the rated flow was achieved and there were not any other problems to operation conditions. Afterward, at 7:33 pm on the same day, we started up the process line of second cesium adsorption instruments. At 7:41 pm, the rated flow was achieved and we started parallel operation.
- At 9:30 am on August 21, we started the desalination facility (reverse osmosis type) 1A and 1B. At 10:30 am on the same day, we confirmed stable operation.
- At approximately 4:00 pm August 23, 2011, we confirmed that Water Desalination 1B (Type of Reverse Osmosis Membrane) had stopped. At 6:20 pm on the same day, we restarted it.
- At 2:21 pm on August 26, cesium adsorption instruments stopped automatically due to the overload of transfer pump (A) for cesium adsorption treated water. At 4:54 pm we resumed the instruments by switching to transfer pump (B) for cesium absorption treated water. At 5:45, it reached normal volume of flow.

- At 11:45 pm on August 27, we stopped Water Desalination 1A (Type of Reverse Osmosis Membrane) because its filter needs to be replaced. At 10:54 am on August 28, we restarted the operation after changing the filter.
- At 7:00 am on August 29, we stopped Water Desalination 1B (Type of Reverse Osmosis Membrane) because its filter needs to be replaced.
- In order to modify the software, at 3:32 am on August 30, we stopped the evaporative concentration apparatus 2A. At 4:16 am, we stopped the evaporative concentration apparatus 2B. After that, at 7:09 am on the same day, we stopped the desalination facility (RO) 1A. At 7:16 am, we stopped the desalination facility (RO) 2. We are continuing water injection to Reactors for Units 1 to 3. We started the desalination facility (RO) 1A at 12:28 pm, and the desalination facility (RO) 2 at 12:42 pm on the same day. We started the evaporative concentration apparatus 2B at 3:44 pm and the evaporative concentration apparatus 2A at 4:34 pm on the same day,
- At 2:00 pm on August 31, we finished commissioning and started full operation of three evaporative concentration apparatuses which we had additionally installed in dissemination devices of water treatment facility.
- At around 3:00 pm on August 31, we confirmed water leakage near the sludge transfer pump (B) for the coagulation settling instruments inside the water treatment system (decontamination instruments). We bypassed a part of the coagulation setting instruments and segregated the pump's surroundings, and then the leakage stopped. The treatment of the accumulated water is continuing.
- Considering the current balance between the storage capacity of fresh water and the amount of water injection to reactors, we stopped all of the evaporative concentration apparatuses of water desalination facilities at 7:44 pm on September 4, while desalination and water injection through desalination facilities (reverse osmosis membrane type) continue.
- At 5:51 am on September 6, the decontamination instruments of Waste Treatment Facility stopped with an alarm indicating a mixer trouble of High Speed Coagulation Settling Facility. We reset and restarted the instruments. However, the same alarm and serious fault alarm went off at 6:21 am, and the decontamination instruments and Cesium adsorption Instruments stopped. As it was confirmed that the current value of overload trip of decontamination instruments was nearly the same level of that for normal operation, we adjusted the value and at 3:13 pm on the same day we restarted the water treatment facility, and at 4:35 pm it reached normal volume of flow.
- At 8:00 am on September 8, Cesium absorption apparatus No.2 at the water treatment facility stopped. As we found out that the cause was erroneous operation, we restarted the apparatus at 12:09 pm on the same day. At 12:12 pm, the facility reached rated flow.
- At 10:06 am on September 12, waste liquid discharge pump (B) in the suppression pool water surge-tank (hereinafter called "SPT") stopped due to overload. At 11:23 am on the same day, SPT waste liquid discharge pump (A) was activated. After that, we inspected SPT waste liquid discharge pump (B) and confirmed that there was no defect in the pump. At 11:53 am on the same day, we restarted SPT waste liquid discharge pump (B) and stopped SPT waste liquid discharge pump (A).
- At 3:58 am on September 13, we stopped Cesium adsorption Instruments and Decontamination instruments for maintenance work of water treatment system. At 6:16 pm on September 14, we started those instruments, and the rated flow was achieved at 7:20 pm.
- We found that the density of radioactive materials is increasing after treatment by decontamination instruments when we check the performance of treatment of water treatment instruments (decontamination instrument and cesium adsorption instrument). In order to find out causes, at 6:22 pm on September 15, we stopped operating the water treatment instruments and at 6:42 pm started to operate only the cesium adsorption instrument and it reached the rated flow (approx. 30 m^3/h) at 6:46 pm. With regard to the second cesium adsorption instrument, it has been in operation.
- Thereafter, in order to purify the water inside waste water tank, at 11:38 am on October 4, we started single circulating operation of decontamination facility. At 2:00 pm on October 16, as the purification of water inside waste water treatment tank was

confirmed, single circulating operation of decontamination facility was stopped.

- At 10:54 am on September 16, we could not monitor flow rate and pressure due to the fault of control board of second cesium absorption tower within the water treatment facility, we manually stopped operation of the facility. Thereafter, we replaced the control board and at 2:50 pm on the same day, restart the facility and at 2:57 pm returned to normal flow rate.
- At 2:16 pm on September 16, we stopped the desalination instrument (RO type) (2) and (3) as water leakage from the instrument (3) was confirmed. After detaching the instrument (3), we restarted the instrument (2) at 2:50 pm on the same day.
- It was confirmed that incorrect adsorption tower (2B) was installed in No.2 cesium adsorption instruments. At 9:47pm on September 20, the instrument was suspended when switching operation was given to the tower. At 10:02pm, the instrument was restarted and reached the regular water flow at 10:10pm.
- At 1:34 pm on September 21, regarding the water desalination equipment (reverse osmosis membrane type) (3), out of its 2 operation system lines, we restarted the instrument (3) with a different line that was not affected by water leakage.
- At 08:50 pm on September 21, a door of the large tent where water desalination equipment (reverse osmosis membrane type) (3) is installed malfunctioned and was subject to an inrush of rainwater due to the typhoon. In response, operations of this equipment have been ceased.
- At 4:53 pm on September 23, we started water treatment at two systems of second cesium adsorption facility. At 5:03 pm on the same day, the flow rate achieved steady state.
- At 9:42 am on September 24, we started operation of desalination facility (reverse osmosis type) (3), which had been stopped due to rain water leakage.
- At approx. 8:30 pm on September 24, the second Cesium adsorption facility of water treatment facility has automatically shut down. Investigations are now underway. Water treatment by Cesium adsorption facility is continuing. As there are sufficient treated water stored in the tank, there is no impact on the water injection into the reactors. After that, we identified that the cause of the shutdown was closure of a valve in the system due to malfunction of an air compressor for valve actuators. After replacing the compressor, at 5:02 pm on September 25, we restarted the 2nd Cesium absorption apparatus and at 5:05 pm, reached the rated flow.
- At approx. 6:17 pm on September 26, one of the pumps (H2-2) of the skid of the Cesium adsorption apparatus has shut down. Through out of the apparatus is decreased approx. from 20 m^3/h to 16 m^3/h. At 11:30 am on September 27, we started pump (SMZ-2) in the Skid for filtering out oil and technetium, and the throughput was adjusted to approx. 20 m^3/h.
- At 10:20 am on September 29, we stopped the desalination instrument (RO type) (2) as water leakage from the flange connection of transferring hose of concentrated water side was confirmed. At 10:45 am on the same day, we confirmed stop of water leakage after stop of the instrument. At 11:40 am on the same day, we restarted the instrument by using another system different from the one that leaked out of 2 systems of process lines. At 11:27 am on September 30, the leaked flange connection was replaced so that the leaked system was resumed.
- At 2:19 pm on September 30, the oil separator treated water transfer pump was tripped due to overload so that the Cesium adsorption apparatus also tripped. At 5:38 pm, the backup pump was initiated and the water treatment by the apparatus was resumed. At 5:50 pm, the flow rate reached normal level. The cause of the overload is currently under investigation.
- At about 9:58 am on October 6, we stopped the operation of the Water Desalinations (reverse osmosis membrane) No2 and No3 because we found stain of leaked water in the water joint at the outlet piping of the Water Desalinations' waste RO supply pump. We fixed the outlet piping and at 1:01 pm on October 6, we restarted the operation of the Water Desalinations(reverse osmosis membrane) No2 and No3.
- A cooperative firm worker discovered leakage from hose for transferring reverse

osmosis membrane concentrated water from the Water Desalinations (reverse osmosis membrane) at 11:45 am on October 8. In order to prevent the leakage, we brought a supply pump of the reverse osmosis membrane concentrated water and the water desalinations No. 2and 3 down. After that, we confirmed a leakage stop at 00:40 pm. We will replace the hose. We changed a line, restarted the water pump and at 2:00 pm on the same day, the water desalinations No.2 and 3 restarted operations.

- At 11:45 am on October 9, we finished a trial operation of 3 sets (3A, 3B, and 3C) of the evaporation condensation equipment which we had additionally installed within the water treatment desalination system and we found no trouble in the equipment.
- At 6:09 AM of October 18, the Cesium adsorption apparatus has been suspended due to power works of the water desalinations. At 9:04 am we suspended Unit No,2.
- At around 11:00 am on October 18 we found accumulated water inside the skid, during motor replacement works of the pump (H2-2) inside the skid of the suspended Cesium adsorption apparatus. We are investigating the cause of this.
- At around 11:00 am on October 18 we found approx. 15cm depth of accumulated water (approx. $3m^3$) inside the skid, during motor replacement works of the pump (H2-2) inside the skid of the suspended Cesium adsorption apparatus. We also confirm that leaking stopped when we found. After that we suspended replacement work of relative motor and started to drain of the accumulated water by submersible pump. The cause is currently under investigation.
- At 9:06 pm on October 19, in the water treatment facilities under operation, a SMZ pump of the 4th process line of cesium adsorption apparatus automatically stopped. A pump of the 3rd process line is continuously operated. Water treatment by the cesium adsorption apparatus is also continuously operated at the flow rate approx. $17m^3/h$ (the flow rate before the automatic stop was approx. $20m^3/h$).
- At approximately 7:52 on October 23, the alarm of the water treatment instrument (RO membrane type) 2-1 was generated and the instrument was automatically stopped. (The water treatment instrument (RO membrane type) 2-2 was continuously operated.) After we confirmed that there was no abnormality at the site, the alarm was reset. At approximately 8:06 am, the instrument was restarted. After the restart, we confirmed that there was no abnormality either at indicators or at the site, therefore we continued the operation.
- At around 11:30 am on October 24, we observed the water leakage (about 20 litters) from the axis seal region of the law water pump (for 2-1 skids use) which was a constitution apparatus of the Water Desalination Facility (RO membrane unit) 2 of the water treatment system and we stopped the facility. Afterward, the water leakage was confirmed to be stopped. At 2:30 pm on the same day, we stopped the line connecting to the water pump and started other water desalinations. At 4:20 pm, the rated flow reached $50m^3/h$. Thereafter, on October 27 and 28, we conducted replacement work of relevant pump.
- On October 26, we replaced the hose for transferring reverse osmosis membrane concentrated water in Water Desalinations (reverse osmosis membrane) that liquid spoil was found on October 8.
- At around 11:00 am on November 6, partner companies' workers who went on patrol found that the boiler of evaporative concentration apparatus stopped, and stopped operation of 3B and 3C of the apparatus. Since the operation panel on the site alerted "low water level in boiler supply water tank", we assumed that the boiler stopped due to this reason. After that, we investigated the cause on decrease of supply tank water level. When we tried to start a backup pump for transfer of boiler supply water, the alert stopped. Thus we judged that one pump was a bad condition. Although all the evaporative concentration apparatus stopped, water treatment by the water desalinations (RO membrane system) and water injection to the reactors have been continued. At 2:55 pm on November 7, we started another boiler by using a spare water transfer pump for boiler. Then, we started evaporative concentration apparatus 3B at 5:24 pm and 3C at 6 pm. Causes of the trouble of the water transfer pump for boiler are still under investigation.
- At 2:24 am on November 8, we manually stopped the boiler of evaporative

concentration apparatus in the water desalinations since alarm worked and indicated decrease of water level in boiler water supply tank at 2:20 am. Then, we stopped evaporative concentration apparatus 3B at 2:28 am ad 3C at 2:31 am. Although all the evaporative concentration apparatus stopped, water treatment by the water desalinations (RO membrane system) and water injection to the reactors have been continued. Thereafter, as a result of the inspection of inlet strainer of boiler make up water transfer pumps (A) and (B), plugging was found due to water scale of filtered water attached to inside of the pipe, after removing those contaminations, evaporated concentration apparatus 3B and 3C was restarted at 5:08 pm and at 6:01 pm on the same day respectively. We will conduct cleaning of strainer at appropriate timing.

- At 4:23 am on November 8, as allophone was observed from the motor of cesium adsorption treatment water transfer pump (B), cesium adsorption apparatus was stopped. After switched to (A) pump, at 4:54 pm, it was restarted and reached to normal operation flow (approx. 18m^3/h) at 5:00 pm. We will investigate the cause. As the apparatus stop time was short, there was no significant effect on the water treatment.
- At around 10:50 am on November 17, water leakage from pin holes at one point of freshwater transfer line, and three points at concentrated water transfer line after desalination process, was confirmed by partner companies' worker who was patrolling at desalination apparatus. At around 2:30 pm on the same day, while water transfer was continued through fresh water transfer line, at the same time, running leakage repair (repaired by tapes) was implemented and completed (leakage amount: approx. 1liter). Cesium adsorption apparatus, 2nd adsorption apparatus and concentrated evaporation apparatus continued operation, and therefore there is no major effect with processing accumulated water. Also, concentrated water transfer line is currently not being used, and is isolated. After that we also conducted emergency repair by repair tape on leaking points at concentrated water transfer line, and after checking on site, we confirmed the amount of leaking water by the concentrated water transfer line was 25 liters. And we confirmed the radiation dose in ambient air near the leaking points were not specifically different from surrounding area. As organized the preparation work of change of the hose for condensed water transferring line and desalination transferring line with the water desalinations (reverse osmosis membrane type) which water leak was found on November 17, we had changed the hose from November 22 to 23.
- At 10:47 pm on November 18, alarm occurred indicating high pressure of treated water, and desalination plant (RO) unit 2-2 suspended due to automatic suspend of a high pressure pump and a booster pump. There is no impact for water injection to the reactor because of enough fresh water stock. On November 22, we checked outside of the unit and found no trouble, and so we remove the discharged water in drain line at exit side of the Unit and reset the alarm. At 2:00 pm on the same day, we restarted the Unit. While we had been checking the operation of the Unit, at 9:56 am on November 23, the alarm occurred again indicating the high pressure of treated water at the exit side of Unit2-2, and the unit stopped automatically. Then, through the external inspection of the equipments (on damage or leakage) and the confirmation of operation state based on the indicators we confirmed that it could be operated. At 11:20 am on December 1, we replaced the pressure button which was seemed to be one of the causes of the alarm and restarted the desalination (RO) unit 2-2. We will keep monitoring its operation state.
- At around 0:15 pm on November 23, when we started desalination plant (RO) unit 1A and 1B to check whether water flows the system properly or not, we found exit side of piping of the units broke and leakage of treatment water in dam, and so we immediately stopped operation of the units. The amount of leakage from unit 1A and 1B are about 14 litters and 15 litters respectively, and now it already stopped leaking. We are now investigating the reason of this incident. There is no impact for water injection to the reactor because desalination plant (RO) unit 2-1 and 3-1 are still operating and there are also enough fresh water stock.
- At 10:20 am on November 25, water leak detected at the pipe arrangement between desalination facility and buffer tanks due to the vent valve open. It is

assumed that the valve was opened in the construction of attaching lagging material to the pipe.

- At 10:30 am on November 25, water leak detected at the pipe arrangement between desalination facility and buffer tanks. At 10:57 transfer pump suspended for the recovery work. At 12:45 pm water leak detected at other two points. At 2:10 pm transfer pump resumed after the recovery work. No impact to the water injection to the reactor because of plenty freshwater stock. Radioactivity density of leaked water was below measurable limit.
- At 12:06 pm on November 29, we observed water leakage from a pin hole at the pipe arrangement between the water desalination facility an the buffer tanks (the leakage amount : approximately 500cc). then, we replaced the pipes and confirmed the leakage was stopped. In addition, there is no influence to the water injection into the reactor due to enough desalination water.
- From 11 am to 1 pm on December 2, we confirmed leakage at 7 points in the hose which was used for the water transfer from the desalination facility to the buffer tank (the leakage was at one or two drops per second.). Then we made a tentative repair with water stopping tape and confirmed that the leakage stopped. Since the leaked water was one treated through decontamination and desalination process and the leaked amount was so little, there will be no impact on the environment.
- At 11:33 am on December 4, workers found that there was puddle water inside the barrier around the evaporative condensation apparatus (estimated volume of water was approx. 45 m^3). At 11:52 am, we stopped the apparatus, and at 12:14 pm, workers made visual inspection of the apparatus and the leakage seemed to have stopped. After that, we conducted investigation at 2:30 pm, and found a crack in the concrete barrier, and water leaking from this crack to the gutter (surface dose rate of leaked water: beta ray 110 mSv/h, gamma ray 1.8 mSv/h). We also found water leaking from between the barrier and the base concrete. We are considering measures to stop this leakage to outside of the barrier. The water desalination apparatus (reverse osmosis membrane type) is continuing operation. As we have sufficient volume of desalinated water, there is no impact on the Reactor water injection. At 3:30 pm we confirmed that the leakage had stopped by piling up sandbags between the barrier and base concrete, and in the gutter. From 6:10 pm to 10: 20 pm we sent the leaked water remaining in the barrier to the waste water RO supply tank with a water pump. Since the gutter led to the generally used channel of the power plant, we have taken sea water from the channel around the water desalinations (evaporative concentration apparatus) and the south drain (drain for the generally used channel) and have conducted a nuclide analysis, and we judged that the leaked water has been discharged into the sea from the exit of generally used channel. It was estimated that approx. 150 liter out of leakage water has flew in the channel, and assumed that it has been discharged into the sea through the generally used channel. As a result, the whole amount of radioactivity was approx. 2.6 x 1010 Bq (temporary). As the impact of the discharge water into the sea, in the assumption that we eat fish and seaweeds around the discharge channel every day, the effective zone for an adult is approx. 0.0037 mSv / year, that equals to approx. 1/600 of annual dose from nature for general public (2.4 mSv), so that we evaluate there is almost no impact.
- Afterwards the similar places were inspected, and then the damage of the concrete floor was found around the evaporative condensation apparatus 1A to 1C. On December 6, the repair work of the concrete floor was completed. The leak water detection device will be installed inside the barrier by December 15 as one of the measures for preventing the recurrence of such leakage, in addition to the patrolling six times a day until the device will be installed. Upon the preventing measures are prepared, and considering the water mass balance, the evaporative condensation apparatuses 1B, 1C and 1A were re-started on 2:33 pm, 2:46 pm and 3:50 pm on December 12, respectively.
- At approx. 11:00 am on December 6, leakage at a pin hole on the transfer hose from a buffer tank to a desalination facility (leakage was a drop per second). It was confirmed that leakage stopped after the temporary repair with the water proof tape. The impact on the environment is minimal as the leaked water is desalinated after the treatment by the radioactive material removal facility and the leaked amount is

little.

- At 3:48 pm on December 11, we confirmed that the water was accumulated inside the gate in the house the water desalination apparatus (evaporative concentration apparatus) 2 was installed. Leaked water is approx. 5 litters, kept within the gate. We also confirmed that the leakage has been stopped, and that it was leaked from a ventilation pipe at the tank storing the seal water for the evaporative concentration apparatus 2B. The source of the water is the filtered water (fresh water), and the radiation doses of the surface near the leaked water are 0.12 mSv/h (gamma ray), and less than 1 mSv/h (beta ray), which are the same level as the airborne radiation doses nearby. We will investigate the cause. Desalination apparatus (reverse osmosis membrane apparatus) 2-1 and 2-2 are continuously working, which generate the sufficient desalinated water, therefore, there is no impact on the water injection to the reactors. At approx. 11:00 am on December 12, we confirmed that the remaining water in the hose was oozing from the leakage point (the leakage amount is about 1 drop in 3 seconds). Later we removed the water from the tank for the seal water and from the hose. At approx. 3:00 pm on the same day, we confirmed that the water ceased to ooze.
- At around 4 pm on December 12, it was found the water spilled from the bucket, which was used to collect drain water from sampling line of the evaporative condensation apparatus 3C. The paddle water was spread around 1 meter radius from the bucket (the capacity of the bucket: approx. 7 liters, spilled water: approx. 3 liters), which stayed inside the barrier. At around 7:30 pm, when replaced the bucket to new one, it was confirmed that there was no leakage form the valve of the sampling line. At around 8:30 pm, when patrolling at the site, it was found that the water spilled from the bucket again. The paddle water was then spread around 1.5 meter radius (the capacity of the second bucket: approx. 12 liters, spilled water: 7 liters), which stayed inside the barrier, too. At around 8:50 pm, the valve of the sampling line was tightly closed as it was found that the valve was not completely closed, and it was confirmed there was no water leakage. Around 10:25 pm, the inlet and outlet valve of the pump was closed for pre-caution. The same operation was done for 3A and 3B of the evaporative condensation apparatuses. At around 11:40 pm, it was confirmed that there was no additional leakage at the site.
- At 7:51 am on December 13, we stopped the transfer of the accumulated water from the basement of Turbine Building of Unit 2 to the centralized radiation waste treatment facility (miscellaneous solid waste Volume reduction treatment building [high temperature incinerator building]) in order to stop power supply to Unit 2 accumulated water transfer pump for power supply enhancing work. With the stoppage of the water transfer, the 2nd Cesium adsorption apparatus was shutdowned for replacing vessels at 8:44 am on December 12, and will be kept outage until December 14 in order to adjust the water level of the centralized radiation waste treatment facility (miscellaneous solid waste Volume reduction treatment building [high temperature incinerator building]). The Cesium adsorption apparatus is continued its operation. Water injection to the Reactors will not be affected since the cooling is continued by using processed water in the buffer tank.
- At 12:25 pm on December 13, recirculation operation for through water desalinations (reverse osmosis membrane) was started to contain the generation of treated concentrated water.
- At 11:38 am on December 16, as we found that there was high vibration at desalination plant (RO) unit 2-2 high pressure pomp, we manually stopped the desalination plant. We confirmed that there is no water leakage at the site. We will study on its countermeasure later. On the other hand, desalination plant (RO) unit 2-1 is in operation. And water injection to the Reactors will not be affected since the cooling is continued by using processed water in the buffer tank.
- At 8:58 am on December 20 we stopped the Cesium adsorption apparatus in order to adjust the water level of each turbine building and the Centralized Radiation Waste Treatment Facility (Miscellaneous Solid Waste compressing building [high temperature incinerator building] and Process Main Building) . At 3:22 pm on January 11, we activated the apparatus. At 3:30 pm on the same day, the flow rate has reached the ordinary level.
- At 1:40 am on December 21, the alarm went off at the desalination facility (reverse

osmosis membrane type) 2-2 which showed that the closing of the backwash water drain valve of the multimedia filter was not conducted within the designated time, which led to an automatic shutdown of the unit. We confirmed at the site that there was no water leak. Since we have enough desalinated water this will not influence the water injection. Desalination facility (reverse osmosis membrane type) 3 can be activated.

Then, as the result of valve activity confirmation investigation, there is no fault in the facilities. Therefore, we considered the phenomenon is transient. At around 10:20 am on the same day, we restarted the unit. We will continue to monitor operation status.

- The second Cesium adsorption apparatus, which had been shut down since 8:44 am on December 12, restarted at 10:37 am on December 27, and reached at rated flow at 10:44 am on the same day. Treatment of accumulated water restarted which has been suspended since December 20.
- At 10:12 am on December 29, TEPCO staff observed a water leakage from the imperceptive leak in a hose around the concentrated water storage area of water desalinations (reverse osmosis membrane) while on patrol. We confirmed that filtrate water*, transferred with the hose from the filtrate tank to the boiler tank of the evaporative concentration apparatus, leaked from the water leakage. Just to be safe, we investigated nuclide analysis for the water, and the nuclide was bellow measurable limit. After that, we stopped transferring filtrate water, and filled the hole with tape, and the leaked water is now an average of a drop every two minutes. We are planning to replace the hose. The leaked filtrate water will not expand around there because there are no street gutters.

[Year 2012]

- At 10:40 on January 9, a water pond was found near the evaporative concentration apparatus 2B (under suspension) of the water treatment facility. The amount of the water is about 11 liter and is staying in the dam. The leakage was from float type flow meter at vent condenser spray line of evaporative concentration apparatus(*) and the amount of leakage is about one drop in 6 seconds. After closing the valve of the line, it was about one drop in 15 ～ 20 seconds. A dish will be settled under the leakage. The water is purified one in evaporative concentration apparatus (for water injection to the reactor). We conduct nuclide analysis for the water of the line regularly and the last result was as fallows: β-ray is 6.0×10-1Bq/c m^3 (November 29, 2011) and γ-ray is below measurable limit （December 20, 2011）.

*Vent condenser spray line of evaporative concentration apparatus: cooling the vapor (purified water) that is generated in the evaporative concentration apparatus and supply water for injection to the reactor.

<Transferring accumulated water in Centralized Radiation Waste Treatment Facility >

[Year 2011]

- At 1:58 pm on July 31, at Centralized Radiation Waste Treatment Facility, we started transferring accumulated water at Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building) to Process Main Building .At 10:21 am on August 1, we stopped the transfer.
- At 9:49 am on August 8, we started transferring accumulated water from miscellaneous solid waste volume reduction treatment building (high temperature incinerator building) to process main building at centralized radiation waste treatment facility. At 6:32 pm on the same day, we stopped the transfer.
- At 10:06 am on August 10, we started transferring accumulated water from On-site Bunker Building to Centralized Radiation Waste Treatment Facility. At 2:19 pm on same day, we stopped transferring.
- In the Centralized Radiation Waste Treatment Facility at 8:50 am on August 17, we started transferring water from Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building) to Process Main Building. At 5:25 pm on the same day, we finished the transfer.
- At 10:20 am on August 21, we started transferring accumulated water from Site bunker building to Process main building at Centralized Radiation Waste Treatment Facility. At 2:31 pm on the same day, we finished the transfer.
- At 10:19 am on September 7, we started transferring accumulated water from Site

bunker building to Process main building at Centralized Radiation Waste Treatment Facility. At 4:01 pm on the same day, we stopped transfer.

- At 10:37 am on October 3, in Centralized Radiation Waste Treatment Facility, we started transferring accumulated water at On-site Bunker Building to Process Main Building. The transfer was stopped at 4:00 pm.
- At 9:44 am on October 19, we started transferring accumulated water from the building of waste storage bunker to process main building. At 2:05 pm on the same day, stopped transferring.
- At 10:00 am on November 4, we started transferring accumulated water from On-site Bunker Building to Centralized Radiation Waste Treatment Facility. At 3:29, the transfer was stopped.
- At 9:31 am on November 24, we started transferring accumulated water from On-site Bunker Building to Centralized Radiation Waste Treatment Facility. At 5:05 pm on the dame day we stopped the transfer.
- At 10:00 am on December 18, during the patrol activity, a TEPCO employee found an accumulated water in the trench located between the process main building of Centralized Radiation Waste Treatment Facility and Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building). The depth of the water was estimated to be 50 cm and the amount was to be 125 m^3. The radiation dose at the water surface was 3 mSv/h (provisional value). As no radioactive materials have been detected during the last sampling survey of sub drain water near the trench, the source of the accumulated water is estimated to be the ground water or dew condensation water. After that we found water inflow from cable duct near the ceiling of the trench by detailed survey at site, and we recalculated the amount of the accumulated water and it was estimated to be approx. 230 m^3. And as a result of the sampling, Cesium-134 was approx. $4.2*10^3$ Bq/cm^3, Cesium-137 was approx. $5.4*10^3$ Bq/cm^3 and Iodine-131 was below detection limit regarding the radioactivity density of the accumulated water in the trench, and Cesium-134 was approx. $1.3*10^{-1}$ Bq/cm^3, Cesium-137 was approx. $1.2*10^{-1}$ Bq/cm^3 and Iodine-131 was below detection limit regarding the inflowing water from cable duct. We have conducted water shut-off treatment of the trench and the groundwater level is higher than the water level in the trench, therefore we assumed that there is no possibility of inflow of the accumulated water in the trench to the groundwater. We will conduct investigation continuously and monitor the water level in the trench.
- Accumulated water in the trench located between the process main building of Centralized Radiation Waste Treatment Facility and Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building) found on December 18 was started to transfer to Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building) from 10:19 am on December 23. At 8:13 pm on the same day, the water transfer was stopped because the planed transfer was completed (transfer volume: about 120 m^3). The volume of accumulated water was estimated at about 230 m^3 from general drawings. However, after confirmation of the structure of the trench in detail, it was estimated at about 220 m^3. In this context, the remaining accumulated water was estimated at about 100 m^3. A method to transfer the remaining water will be planned from now.
- At 10:14 am on December 27, we started transfer of accumulated water from site banker to process main building in the centralized radiation waste treatment facility. At 3:18 pm on the same day we stopped the transfer.

[Year 2012]

- On December 18, 2011, we found accumulated water in the trench located between the process main building of Centralized Radiation Waste Treatment Facility and Miscellaneous Solid Waste Volume Reduction Treatment Building (High Temperature Incinerator Building). After that we confirmed that water inflow from cable duct near the ceiling of the trench. As a result of the inspection, the cable duct was used for the PHS line and led to the electric wire duct line of the outdoor lighting, and we estimated that the puddle of water near the lighting flowed through the opening of electric wire duct line which was made by a tsunami, into the trench. On January 5, 2012, we cut the cable duct line and carried out water stops work with seal materials and seal tape at both entrance and exit sides of the duct line. On January 6, we confirmed that there is no inflow of the water into the trench from the cable duct line. For the concerned trench, we will investigate for the identification the leak in point of the highly-concentrated radioactive contaminated water sequentially, and examine and carry out the investigation to determine the causes and recurrence preventive measures, and carry out the check for other trenches in the Fukushima Daiichi Nuclear Power Plant.

- Because of the finding of accumulated water included radioactive materials at the trench between the Process Main Building and the Miscellaneous Solid Waste Volume Reduction Treatment Building[High Temperature Incinerator Building](December 18, 2011), we started the inspection of other trenches at the site on January 11.
- As a result of the inspection of January 11, the locations where accumulated water was discovered and the nuclide analysis results are as follows:

 ・The Unit 2-4 DG connecting duct

  - I-131：below measurable limit, Cs-134：approx. 1.9×10^{0}Bq/cm3、Cs-137：approx. 2.6×10^{0}Bq/cm3

 ・The accumulated water treatment building～the connecting duct in the Unit 1 turbine building

  I-131：below measurable limit, Cs-134：approx. 8.8×10^{-1}Bq/cm3、Cs-137：approx. 1.3×10^{0}Bq/cm3

In the inspection conducted on January 12 we confirmed puddle water and the results of nuclide analysis as shown below.

・ Unit 1 chemical tank connecting duct

 I-131: below measurable limit, Cs-134: 2.4×10^{0}Bq/cm^3 ,Cs-137: 3.5×10^{0}Bq/cm^3

In the inspection conducted on January 12, we confirmed a puddle in the Unit 3 transformer cable duct for activation. As a result of nuclide analysis, the radioactive concentration of the puddle water is below measurable limit for I-131, 4.9×10^{1}Bq/cm^3 for Cs-134, 6.9×10^{1}Bq/$cm^3$for Cs-137 （Total of the major three nuclides reaches 100Bq/cm^3）. As indicated above, it was found out that the water contained relatively highly-concentrated radioactive materials. We presume that the accumulated water in the building is not likely to have flown into the cable duct since the water level (water surface) of the puddle is higher than that of the accumulated water in the building.

We confirmed that there was no puddle in the duct for radioactive fluid of Unit 3.

- As a result of the inspection of January 13, the locations where accumulated water was discovered and the nuclide analysis results are as follows:

・Unit 1 radioactive fluid piping duct

 I-131: below measurable limit, Cs-134: 1.4×10^{0}Bq/cm^3 ,Cs-137: 1.9×10^{0}Bq/cm^3

・Unit 4 radioactive fluid piping duct

 I-131: below measurable limit, Cs-134: 2.2×10^{1}Bq/cm^3 ,Cs-137: 2.8×10^{1}Bq/cm^3

- At 9:47am on January 11 2012, we started to transfer accumulated water from the On-site Bunker Building of the Central Radiation Water Treatment Facility to the Process Main Building. At 3:32 pm on the same day, we stopped the transfer.

<Common spent fuel 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.

[Year 2011]

- At 11:04 am on July 30, we started transferring accumulated water in common spent fuel pool building to the tank located at upper stream of water desalinations (tank located at down stream of suppression pool water surge-tank) and stopped transferring at 5:45 am on August 2.

- At 11:08 am on September 14, the Common Pool's cooling system was shutdown to move a Common Pool Power Center so that we will replace a power panel installed at the basement of Common spent fuel pool. At 5:22 pm on September 19, the transfer of the Common Pool Power Center was completed, Common Pool's cooling was restarted.
- At approximately 11:00 am on September 20, a puddle of water was found at the basement of common spent fuel pool. As a result of nuclide analysis of the water, some radioactive materials (Cs 134: 4.7～7.0×10^{0} [Bq/cm^3], Cs 137: 5.4～8.1×10^{0} [Bq/cm3], Co 60: 1.2×10^{0} [Bq/cm3]) were detected. However we assume that there is no leakage outside because any pipeline connecting to the outside does not exist. We are now investigating sources of the influent water.
- On October 27, while the staff from a cooperating company was conducting an annual checkup of the ceiling crane, which handles used fuel casks, a crack was found on the casing of the connection point of the vehicle for driving. We will inspect the further details of the connection point.
- In order to change the power board for the common spent fuel pool facility, at 9:28 am on December 9, we stopped cooling the common spent fuel pool (the water temperature of the common spent fuel pool at that time: approx 18.8 Celsius). On the same day, with completion of change work of the power board, at 11:am, we resumed cooling (the water temperature of the common spent fuel pool at that time: approx 19.1 Celsius).

[Year 2012]

<Injured / ill health> (Latest)

[Year 2011]

- At approximately 9:30 am on August 7, at cooperative firm rest area inside the site, a cooperative firm worker who was managing access control expressed dull feeling in the right knee and he was sent to Iwaki Kyoritsu Hospital by an ambulance. However, the cause was unknown. As a result of medical reexamination at Chiba Social Insurance Hospital, he was diagnosed as "Traumatic right knee synovialis ecchymoma"
- Around 12:05 pm on August 10, one partner company worker who was mowing for curing of water treatment hose at west side of Centralized Radiation Waste Treatment Facility (outside) was injured by sickle and was transferred to the Fukushima Rosai Hospital by the ambulance at 2:11 pm. His body has no contamination. He has been diagnosed as contused wound of lower right thigh.
- At approx. 2:40 on August 26, a worker from a partner company (contractor) was injured while engaged in a preparatory work to remove debris accumulated on Reactor Building, Unit 3. At 4:05 pm, after medically examining and treating at Emergency Medicare Room of Units 5 & 6, we ambulanced him to J Village. At 5:32 pm, he was sent to Fukushima Rosai Hospital, and was diagnosed "a fractured second finger", but not radioactively contaminated.
- At 9:35 am on August 31, we implemented the drainage work of spent vessels at the temporary storage area for spent vessels for the water treatment system. When workers, who assumed the valve was closed, dismantled the hose, water from the tank and the hose scattered towards two (2) workers from one of our affiliated companies. High-level radiation dose was confirmed by measuring the radiation of the filters of the mask worn by the workers. On the other hand, we confirmed that there was internal exposure dose after checking by WBC.
- On September 8, a worker of co-operating company forgot to bring the full-face mask when that worker commuted from J-Village to Fukushima Daiichi Nuclear Power Station. At 5:55 am, when the worker entered the Main Anti-Earthquake Building, it was found out that the worker did not wear the full-face mask. We evaluated the internal exposure dose of the worker and confirmed that the level was insignificant to cause bodily influence.
- At 12:40 pm on September 14, we found 4 out of 6 partner company workers contaminated when we were decontaminating the full-face masks of the workers who were engaged in maintenance work of the water processing system. By the use of whole body counter, we will check if they have take in radioactive materials. Then, as a result of the measurement by whole body counter, we have evaluated that no one took

in radioactive materials.

- At approximately 4 pm on September 14, a TEPCO employee who returned from the patrol on the generators of Units 1 to 4 (outdoors) to Visitors Hall of Fukushima Daini Nuclear Power Station got decontaminated since contamination at his chin and neck was detected. Then as a result of the measurement by whole body counter, we have evaluated that no radioactive materials was taken in.
- At approximately 8:18 am on September 15, we found a partner company worker unequipped with a charcoal filter to the full-faced mask after the worker entered the site of Fukushima Daiichi Nuclear Power Station. Then as a result of the measurement by whole body counter, we have evaluated that no radioactive materials was taken in.
- At approximately 9:40 am on September 20, a hand of a worker of a partner company who was moving the on-house transformer outside hit his own full-face mask, and the filter of his mask came off temporarily. Afterwards, as a result of measurement by the whole body counter, we confirmed that there was no internal exposure.
- One of the staff from the cooperating companies was injured catching his forth finger between the steel stocks in site of the power plant (outdoors) at 11:05 am, September 26. The staff returned to the office outside the site and headed for the emergency medical office with a surgical mask on. As a result of the measurement by whole body counter, we have evaluated that no radioactive materials was taken in Contamination on the surface of the body and the surgical mask is not detected.
- At around 10:30 am on September 29, the worker of the partner company got water from the drain hose to his full-face mask, when conducting the transfer of the concentrated waste water at the Water Treatment Facility. Since it is confirmed that the part around mouth of the worker was contaminated, we conducted measurement by whole body counter. As the result of the measurement, we have confirmed that the worker did not take in any radioactive materials.
- Radio active contamination was detected from left waist, chin and jugular of one TEPCO's staff who had confirmed the situation of liquid leakage from water desalinations (reverse osmosis membrane type), when he returned to the visitor hall of Fukushima Daini Nuclear Power Station at 4:31 pm on October 8, 2011. He was checked by the whole body counter and according to the result, we evaluated he ingested no radioactive material.
- At around 4:03 PM of October 17, we detected radiation from near the mouth of one of our employees who returned to the visitor's hall of Fukushima-Daini Nuclear Power Plant from cooling water injection works at the second floor of reactor No.1. After a further screening test by a whole body counter we concluded that there was no internal exposure.
- At around 2:20 pm on October 28, one of TEPCO's employee conducting document check at administrative building has removed face mask when that employee felt sick and vomit, We plan to conduct check the intake by whole body counter. We have confirmed there was no contamination on the face. After testing by the whole body counter, we evaluated that he did not have intake of radioactive substances.
- At 8:30 am on October 29, two workers from the cooperating companies were injured during dismantling of the large crane used to install the cover for the Reactor Building, Unit 1 within the site boundary. At 10:35 am on the same day, one worker was transferred to Fukushima Medical University Hospital by a helicopter ambulance and got treatment including surgery. At 2:20 pm on the same day, the other worker was transferred to Iwaki Kyouritsu Hospital by a company car and had an inspection.
- At 0:32 pm on November 14, an alarm went off at the measure (Continuous Dust Monitor) installed in front of the main gate, which had continuously measured the radioactivity concentration in air. The cause of the alarm was assumed to be a defect of the equipment by clogged filters. Around 1:08 pm on the same day, the measure was reset and the monitoring was resumed. The dust concentration near the main gate was measured 6 x 10-6 [Bq/cm^3], which was less than the reference measure for wearing a full face mask, 1 x 10-4 [Bq/cm3]. Although an instruction to wear a full face mask since 0:39 pm was given responding the alarm, around 2:11 pm on the same day it was announced that the workers did not have to wear a full face mask as per normal.
- Approx. at 2:28 pm on November 28, the alarm went off from an indicator installed

in front of Main Anti-Earthquake Building to continuously measure airborne radiation dose (continuous dust monitor). In response to the alarm, we instructed to put full face masks on at 2:38 pm accordingly. We are measuring the airborne radiation dose in front of Main Anti-Earthquake Building, and investigating the cause.

We confirmed that there are no significant changes in the readings of the monitoring posts.

- At 2:50 pm on the same date, we replaced the filter of the monitor, and restarted by reset operation. From the result of the airborne radiation dose measurement in front of Main Anti-Earthquake Building, the airborne radiation dose in front of Main Anti-Earthquake building was less than detection threshold (7.34 x 10-6 [Bq/cm^3]), which was less than the reference measure for wearing a full face mask, 1 x 10-4[Bq/cm^3]. At 4:04 pm on the same date, it was announced that the workers did not have to wear a full face mask as per normal.
- On December, 17, one of the TEPCO's employees serving for restoring work at Fukushima Daiichi Stabilization Center was diagnosed with Norovirus. Up until now, there have been no reports of Norovirus onset other than this employee. We have disinfected the working area etc. of this employee. With advice from doctors, we plan to inform persons/parties concerned of fundamental matters such as strict enforcement of washing hands and gargling, re-enforcement of disinfecting ways in case of onset, a medical team responding system etc. within this week.
- On December 19 an employee of TEPCO who engaged in repair works at Fukushima Daiichi Stabilizing centre was diagnosed as infected by Noro virus. Other than the two workers (including the employee mentioned above) that were diagnosed as infected by Noro virus so far, another TEPCO employee who engaged in works at the Fukushima Daiichi Power Plant was diagnosed as Gastroenteritis caused by a virus. We disinfected the working office of the two TEPCO employees. We plan to inform persons/parties concerned of fundamental matters such as strict enforcement of washing hands and gargling, re-enforcement of disinfecting ways in case of onset, a medical team responding system etc.
- On December 26, two of TEPCO's employee who were engaged in recovery work at Fukushima Daiichi Nuclear Power Station was diagnosed as influenza. On December 27, one TEPCO's employee who was also engaged in recovery work at Fukushima Daiichi Stabilization Center was newly diagnosed as influenza. We will take countermeasure for infection and escalation prevention by promoting hand washing, gargle, finger disinfecting and cough etiquette and will endeavor to set and use thermometer, finger disinfecting alcohol, mask.

[Year 2012]

- At around 2:22 pm on January 9, at the Spent Sludge Storage Facility (*) of Fukushima Daiichi Nuclear Power Station (1F), a partner company's worker who had been engaged in concrete placement work reported his physical disorder. He was carried to the emergency medical room of 1F's Unit 5/6 and received medical treatment. Because he was in cardiopulmonary arrest, he was carried from 1F to Iwaki Kyouritsu Hospital at 3:25 pm. For reference, no radioactive materials were found to be attached to the worker's body.
- At around 1 pm on January 11, we were reported from the partner company that his death was confirmed by a doctor at 5:02 pm on January 9.

*Spent Sludge Storage Facility: The facility to store radioactive waste (spent sludge), which is produced during the process of accumulated water treatment, on a temporary basis.

Fukushima Daini Nuclear Power Station

Units 1 to 4: Shutdown due to the earthquake

[Year 2011]

- The national government has instructed evacuation for those local residents within 10km radius of the periphery.
- From July 29, we are conducting major inspections of 6 Monitoring Posts located (No. 1 to 6) at the boundary of power station's premise out of 7 Monitoring Posts.

  (Regular inspection)

  MP No. 6: regular inspection from 9:31 am to 6:30 pm on July 29.

  MP No. 1: regular inspection from 9:31 am on August 2 to 2:30 pm on August 3.

MP No. 3: regular inspection from 9:31 am to 6:00 pm on August 4.

MP No. 4: regular inspection from 9:31 am to 5:40 pm on August 5.

MP No. 5: regular inspection from 9:31 am to 8:00 pm on August 8

MP No. 2: regular inspection from 9:31 am to 5:40 pm on August 9

- Out of 7 monitoring posts set at the boundary of the plant site, we started the replacement work of No.6 for the purpose of the preventive measure. The work is planned to be conducted from Oct 11 to 21. This monitoring post won't be able to measure airborne radiation dose temporarily during the work, however, we will measure and the dose by the other 6 monitoring posts. At 7:00 pm on Oct. 21, replacement work was completed. While replacement work was under way, the data for the monitoring post was not recorded. However, we have confirmed that there have been no significant changes to the data taken from other monitoring posts.
- 7 monitoring posts have been installed at the border of the power station site. We started construction (planned from October 25 to December 20) of a permanent building for the measurement equipment, etc. of No.7 which had been installed in the temporary building. On December 20 this structure was completed as scheduled and until December 21 this monitoring post will temporarily be out of order due to removal of detectors and other measurement apparatus, but the six other posts will continuously monitor the radioactive material in the air.

[Year 2012]

- At around 14:22 on January 9, at the Spent Sludge Storage Facility (*) of Fukushima Daiichi Nuclear Power Station (1F), a partner company's worker who had been engaged in concrete placement work reported his physical disorder. He was carried to the emergency medical room of 1F's Unit 5/6 and received medical treatment. Because he was in cardiopulmonary arrest, he was carried from 1F to Iwaki Kyouritsu Hospital at 3:25 pm. For reference, no radioactive materials were found to be attached to the worker's body.
  * Spent Sludge Storage Facility: The facility to store radioactive waste (spent sludge), which is produced during the process of accumulated water treatment, on a temporary basis.

【Unit 1】

[Year 2011]

- Unit 1 residual heat removal system (B) was stopped at 6:25 am, September 26 in order to transfer the power supply cable (temporarily installed) to the residual heat removal systems (B) of Units 1 and 2. We restarted the residual heat removal system (B) at 4:15 pm on the same day.
- At 6:00 pm on September 30, grease oozing was confirmed at the joint connecting the pump for residual heat removal system (B) and the motor. At 9:58 am on October 1, the residual heat removal system (B) was stopped to conduct an inspection. As a result of inspection, we assumed grease oozing was occurred due to excessive grease filling to the joint connecting. After that, we adjusted fill ration of grease. At 4:21 pm on the same day, we resumed cooling reactor by residual heat removal system (B).
- As to residual heat removal system A of Unit 1 which was unable to use due to Tsunami effect of Mar. 11, on November 17, the trial run was conducted in order to investigate soundness. At 3:35 pm on the same day, it was restored to stand-by status. At 5:15 pm on the same day, we switched residual heat removal system B to residual heat removal system A. At 5:29 on the same day, the system A started to operate
- At 10:06 am on December 27, for the purpose of determine soundness of reactor primary containment vessel of unit 1 and internal facilities, airlock for the workers (hatch to enter into the primary containment vessel) was opened and started sight survey.

[Year 2012]

【Unit 2】

[Year 2011]

- From 2:22 pm to 3:02 pm on August 6, we conducted commissioning of Residual Heat

Removal (RHR) system (A) of Unit 2, which had been stopped due to tsunami and it has transited to stand by mode.

- At 1:57 pm on August 8, we stopped residual heat removal system (B) due to the switching of temporary power cables in the heat exchanger building of Unit 2. At 2:29 pm, we activated residual heat removal system (A).
- At 12:59 pm on August 30, while operating High Pressure Core Spray Component Cooling System*1 and High Pressure Core Spray Component Cooling Sea Water System*2 in order to adjust the water quality in High Pressure Core Spray Component Cooling System, the motor of High Pressure Core Spray Component Cooling Sea Water System Pump stopped. Later, we confirmed a defect in insulation resistance at the site. As Unit 2 is in cold shutdown and necessary functions of water injection are secured, it satisfies obligations under the safety provisions for security management.
- At 10:57 am on September 25, we stopped residual heat removal system (B) of Unit 2 due to the replacement work of temporary power cables for the residual heat removal system (B) of unit 1 and 2. At 11:11 am, we activated residual heat removal system (A). At 6:25 am on September 26, we stopped Residual Heat Removal System (B) of Unit 1.
- At 10:57 am on October 4, Residual Heat Removal System (A) has stopped due to the replacement of cable (temporary) to Residual Heat Removal System (A) of Unit 2. At 11:18 am on the same day, Residual Heat Removal System (B) has started.
- At 11:25 am on October 7, we stopped Residual Heat Removal system (B) regarding switching work from Residual Heat Removal system (B) to (A), and started operation of Residual Heat Removal system (A) at 11:42 am on the same day.
- At 2:44 pm on December 6, along with the switching work from Unit 2 the residual heat removal system (A) to (B), the (A) system was stopped. At 3:11 pm. (B) system was activated.

[Year 2012]

【Unit 3】

[Year 2011]

- At 11:53 am on August 31, we completed restoring and started operating Unit 3 emergency diesel generator (A).
- At 2:00 pm on August 8, we stopped a residual heat removal system of Unit 3 (B) and activated Unit 3 (A) at 2:26 pm on the same day in order to switch the operation from (B) to (A).
- At 2:08 pm on December 1, Residual Heat Removal System (A) in Unit 3 was stopped in order to switch operation from system (A) to (B). At 2:19, System (B) was activated.

[Year 2012]

- At 2:47 pm on January 13, Residual Heat Removal System (B) 3 was stopped in order to switch operation from system (B) to (A). At 3:16 pm, System (A) was activated.

【Unit 4】

[Year 2011]

- From 11:54 am to 12:24 pm on August 2, we conducted a test run of the residual heat removal system (A) of Unit 4, which was stopped due to the influence of tsunami and then it has been kept in standby condition.
- At 10:33 pm on August 3, we stopped operation of Residual Heat Removal System due to switching from the Residual Heat Removal System (A) to the Residual Heat Removal System (B) with switching the temporary cable of heat exchanger building of Unit 4. At 11:00 pm on the same day, we restarted the operation.
- At 10:15 am on 29th August, in order to investigate soundness of reactor containment vessel and inside facilities, we have opened airlock for site workers (hatch to enter into the primary containment vessel), and we started investigation. On September 7, we implemented the cleaning and decontamination. Since November 21, we had been

conducted the visual inspection of the reactor containment vessel and inside facilities and finished the inspection today. In the result, there were no reactor coolant leakages and no damages of facilities, equipments and pipes. Therefore, we have confirmed that there are no harmful effects for cold shutdown. Although there were some removal of paints of equipments due to high temperature and humidity, we estimated it has no direct impact on the cold shutdown. We will conduct detail inspection of the reactor containment vessel including inside facilities.

- At 3:43 pm on October 4, Residual Heat Removal System (A) has stopped due to the replacement of cable (temporary) to Residual Heat Removal System (A) of Unit 4. At 3:53 pm, Residual Heat Removal System (B) has started. As the replacement was finished, the Residual Heat Removal System (B) of Unit 4 has stopped at 5:01 pm on October 5, and the Residual Heat Removal System (A) has started at 5:08 pm.
- On November 7, 2011, we started inspection work of the main turbine in order to confirm the facilities' status after the quake for Unit 4.

[Year 2012]

※ - At 11:24 am on January 5 2012, according to switching works from Residual Heat Removal System (A) of Unit 4 to (B), we suspended Residual Heat Removal System (A) and activated Residual Heat Removal System (B) at 11:37 am on the same day.

- On November 7 2011, we started inspection work of the main turbine of Unit 4 in order to confirm the facilities' status after the quake. On January 11 2012, we finished visual inspection in the low pressure turbine (A) and the high pressure turbine. Although we found not only some cracks caused by normal operation but also some contact traces, which is located at moving and stationary blade of the low pressure turbine (A) and the high pressure turbine and oil thrower bearing, caused by the Tohoku-Chihou-Taiheiyou-Oki Earthquake, we confirmed they are minimal damage and we made sure there was no security issues.

  *1 : moving blade

  The moving blade is rotated by the intake steam, which is set at rotor

  *2 : stationary blade

  The stationary blade is structure, which is fixed on the casing in order to guide the intake steam to the moving blade effectively.

【Others】

[Year 2011]

- On August 29, in the heater building of Unit 4, condition of a site worker of co-operating company who was in charge of rerouting the temporary cable got worse. At around 10:50 am, as heat stroke was suspected, we treated the patient with drip infusion and at 11:26 am, we transferred to J-Village by our ambulance. At 11:58 am, the patient was transferred to Iwaki Kyoritsu Hospital by ambulance. No radioactive material attached to the body was found. The doctor examined and confirmed that the patient had heat stroke.
- At around 2:50 pm on October 17, we confirmed that a worker of partner company who was engaged in cleaning inside of Primary Containment Vessel of Unit 4 was exposed to radiation 1.58mSV, which is excess to the planned radiation 0.9mSV. After the result of the investigation, we guessed that the radiation administrator set the working time without featuring the work of near the high radiation place, because he missed the high radiation dose which was confirmed by pre-measurement. Furthermore, the worker was not aware of the sound of his APD and kept the work, since he had on his hood mask and was using a cleaner.
- Installation work of seismic isolation system in the exhaust stack started from November 2010 has been suspended since the occurrence of injury incident in the tower crane room due to the damage in the fixed portion of construction tower crane from the earthquake. As the implementation of safety countermeasure is completed, on October 31 heavy equipments were brought into the site for the replacement of the tower crane and installation work has restarted.
- On December 26, one of TEPCO's employee who was worked at Fukushima Daini Nuclear Power Station was newly diagnosed as Noro virus. Disinfecting of the

working environment was conducted. We will continuously promote hand washing and gargle, The basic issues such as disinfection method and response of medical team will be reminded.

[Year 2012]

Kashiwazaki Kariwa Nuclear Power Station

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

[Year 2011]

- The 16th regular inspection of Unit 1 started on August 6.
- The 10th regular inspection of Unit 7 started on August 23.

[Year 2012]