

Nuclear Power Stations' Response to the Off the Pacific Coast of Tohoku Earthquake

1. Effects on nuclear power stations immediately after the earthquake
 - (1) Tokyo Electric Power Company's Fukushima Daiichi Nuclear Power Station (hereafter referred to as "1F")
Unit-1~3: Automatic shutdown triggered by the earthquake
(Unit-1 : 460,000kWe, Unit-2 and 3 : 784,000kWe)
Unit-4~6: In outage shutdown
(Unit-4 and 5 : 784,000kWe, Unit-6 : 1.1 million kWe)
 - (2) Tokyo Electric Power Company's Fukushima Daini Nuclear Power Station (hereafter referred to as "2F")
Unit-1~4: Automatic shutdown triggered by the earthquake
(Unit-1~4 : 1.1 million kWe)
 - (3) Tohoku Electric Power Company's Onagawa Nuclear Power Station (hereafter referred to as "Onagawa NPS")
Unit-1~3: Automatic shutdown triggered by the earthquake
(Unit-1 : 524,000kWe, Unit-2 and 3 : 825,000kWe)
Acceleration of 567.5 gal was measured.
 - (4) Tohoku Electric Power Company's Higashidori Nuclear Power Station (hereafter referred to as "Higashidori NPS")
Unit-1: In outage shutdown (Unit-1 : 1.1 million kWe)
Acceleration of 17 gal was measured.
 - (5) Japan Atomic Power Company's Tokai Daini Nuclear Power Station (hereafter referred to as "Tokai No.2")
Automatic shutdown triggered by the earthquake (1.1 million kWe)
2. Nuclear power stations' response after the earthquake
(adapted from news statements of the prime minister's office, Nuclear and Industrial Safety Agency (NISA) and TEPCO)
 - (1) Tokyo Electric Power Company's 1F
March 11 (Fri)
 - 14:46 The earthquake automatically shut down the unit-1~3.
 - 15:42 Confirmed conditions of unit-1~3 should be reported under Article 10 of the Act on Special Measures Concerning Nuclear Emergency Preparedness (hereafter referred to as "Nuclear Emergency Preparedness Act")
(Due to the complete loss of A/C power; although the loss of off-site power led to the automatic startup of emergency diesel generators, but the generators failed.)
 - 15:45 Oil tanks were lost in Tsunami (according to the prime minister's office).
 - 16:36 Confirmed conditions of unit-1 and 2 should be reported under Article 15 of the Nuclear Emergency Preparedness Act.

(Due to loss of the emergency core cooling system's coolant injection function; coolant injection into unit-1 and 2 could not be confirmed, leading to taking a precautionary report)

19:03 Declaration of nuclear emergency

(Nuclear emergency was declared as the reactor water level at unit-1 and 2 could not be confirmed, suggesting the loss of reactor coolant.)

20:50 Fukushima Emergency Headquarters instructed the evacuation to local residents within 2km radius of 1F (1,864 people in residence within the 2km radius)

21:23 According to Article 15 Paragraph 3 of the Nuclear Emergency Preparedness Act, the government instructed the evacuation of local residents within 3km radius of 1F. Residents within 10km radius were instructed to stay in-house.

March 12 (Sat)

01:20 Confirmed conditions of unit-1 should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (Due to unusual rise of the pressure in PCV)

05:44 The prime minister instructed the evacuation of local residents within 10km radius of 1F.

06:50 According to Article 64 Paragraph 3 of the Act on the Regulation of Nuclear Source Material, Nuclear Fuel Material and Reactors (hereafter referred to as "Nuclear Reactor Regulation Act"), the Nuclear and Industrial Safety Agency (hereafter referred to as "NISA") ordered to implement measures to reduce the pressure of the reactor containment vessel at unit-1 and 2.

15:36 Hydrogen explosion was occurred at unit-1.

(Loss of upper external walls and ceiling of the reactor building of unit-1)

16:17 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (Due to the radiation dose near 1F's No.4 monitoring post (hereafter referred to as "MP") exceeded the criteria (500 μ Sv/h)).

18:25 The prime minister instructed the evacuation of local residents within 20km radius of 1F.

20:05 NISA ordered the injection of sea water to unit-1 according to Article 64 Paragraph 3 of the Nuclear Reactor Regulation Act.

20:20 The injection of sea water and boric acid to unit-1 was commenced.

March 13 (Sun)

05:10 Confirmed conditions of unit-3 should be reported under Article 15 of the Nuclear Emergency Preparedness Act.

(Due to loss of the emergency core cooling system's coolant injection function; the complete loss of the coolant injection function at unit-3)

08:56 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (MP4)

(Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])

- 09:20 Ventilation was achieved at unit-3. (Ventilation valves were operated to complete the depressurization measure at 8:41.)
- 09:25 Unit-3 Began injecting fresh water containing boron into reactor from fire extinguishing system line.
- 09:30 According to the Nuclear Emergency Preparedness Act, the prime minister instructed the content of decontamination screening.
- 13:12 Injection was switched from fresh water to sea water at unit-3 and began boron injection.
- 14:15 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (MP4) (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])

March 14 (Mon)

- 01:00 Seawater injection into the pressure vessel of unit-1 and unit-3 was suspended.
- 03:20 Seawater injection into the pressure vessel of unit-3 was resumed.
- 03:50 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act (around MP6). (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 04:15 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act (around MP2). (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 06:10 Drywell pressure of unit-3 rose to around 460KPa (maximum design operating pressure: 427KPa)
- 06:50 Containment vessel pressure of unit-3 rose to 530KPa.
- 07:44 Confirmed conditions of unit-3 should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (Due to unusual rise of the pressure in PCV)
- 09:05 Containment vessel pressure of unit-3 gradually decreased to 490KPa.
- 09:27 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (MP6) (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 11:01 There was an explosion in unit-3.
- 13:25 Confirmed conditions of unit-2 should be reported under Article 15 of the Nuclear Emergency Preparedness Act.
(Due to the loss of reactor cooling function)
- 18:22 The reactor water level at unit-2 reached -3700mm, indicating that fuel rods were fully exposed.
- 21:37 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's main gate).
(Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 22:50 Confirmed condition of unit-2 should be reported under Article 15 of the Nuclear Emergency Preparedness Act.

(Due to unusual rise of the pressure in PCV)

March 15 (Tue)

- 06:10 An odd noise was heard from around suppression chamber at unit-2, followed by a drop in the chamber's pressure, suggesting the development of an abnormal event at the chamber.
- 06:14 Loud noise left holes in the walls at unit-4.
Smoke was rising from unit-3.
- 06:51 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's main gate). (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 06:56 The top of the reactor building of unit-4 appeared disfigured.
- 08:11 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's main gate). (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 08:25 Identified white smoke was rising from the 5th floor of unit-2's reactor building.
- 09:38 Detected fire at the northwest corner of the 3rd floor of unit-4's reactor building, and reported to the fire department.
- 10:01 The Ministry of Economy, Trade and Industry asked the U.S. military to engage in a fire-fighting operation at unit-4.
- 10:22 The radiation levels were 30mSV/h at the point between unit-2 and unit-3, 400mSV/h around unit-3 and 100mSV/h around unit-4 respectively.
- 10:59 An evacuation order was issued to the staff of 1F offsite center.
- 11:26 The staff of 1F offsite center had evacuated to the Fukushima prefectural government building.
- 12:25 The fire extinguishment at unit-4 was confirmed. (Visual confirmation from outside due to the inability to enter the building)
- 16:17 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's main gate) (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 23:05 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's main gate) (Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])

March 16 (Wed)

- 05:45 Detected fire at the northwest corner of the 3rd floor of the reactor building at unit-4.
- 06:20 TEPCO reported the fire at unit-4 to the local fire department.
- 08:34 Observed large amount of white smoke rising from unit-3.

11:14 It was suspected that the white smoke from unit-3 was due to a large volume of steam rising from the spent fuel storage pool.

March 17 (Thu)

- 09:48 Unit-3 dousing of seawater drop operation by Self-Defence Force(hereafter referred to as "SDF") helicopters (4 times) (~10:00) .
- 19:05 Unit-3 dousing of seawater by Police's water cannon truck (once) (~19:15).
- 19:35 Unit-3 dousing of seawater SDF used fire trucks (5 times) (~20:09).
(Radiation doses before and after the operation: 3,630 3,586 μ Sv/h)

March 18 (Fri)

- 10:00 Confirmed the shared spent fuel pool is full (temperature: 55 C). In addition, the exterior visual inspection of the dry cask building found no anomalies.
- 13:30 Completed the work for making hole opening on unit-5.
- Around 14:00 1F Unit-3 dousing with the fire trucks by SDF (7 times) (~14:38)
- 14:42 Unit-3 dousing by U.S. Forces' high pressure water cannons operated by TEPCO. (~14:45)
- 17:00 Completed the work for making holes on unit-6.
- 17:48 NISA announced the results of temporarily rates of INES (International Nuclear and Radiological Event Scale).
- Units-1, 2, 3: Level 5 (Accident with wider consequences)
 - Unit 4 : Level 3 (Serious incident)

March 19 (Sat)

- 00:30 Unit-3 continuous dousing by fire trucks of Hyper Rescue Unit of Tokyo Fire Department (hereafter referred to as "HRU") (~00:50)
- 05:00 Unit-5 cooling of the spent fuel pool started as C-RHR pump operation had been resumed.
- 07:42 The power source of units-5 and 6 were secured as unit-6 two emergency diesel generators became operable.
- 08:58 Confirmed conditions of 1F should be reported under Article 15 of the Nuclear Emergency Preparedness Act. (around the station's west gate)
(Due to the radiation dose at the site's boundary exceeding the criteria [500 μ Sv/h])
- 09:15 Completed the work for making 3 holes each on the roofs of unit-5 and 6's reactor buildings for preventing hydrogen gas retention.
- 14:05 Unit-3 continuous dousing of seawater by HRU (~03:40 on March 20)
(Radiation dose before and after the operation : 3,417 2,758 μ Sv/h)
- 18:30 Unit-5 spent fuel pool temperature dropped.
(68.8C (06:00 on March 19) => 48.1C (18:00))
- 22:14 Unit-6 cooling of the spent fuel pool started as C-RHR pump operation had been resumed.

March 20 (Sun)

- 03:00 Unit-6 spent fuel pool temperature dropped.
(67.5 C (19th 23:00) => 52.0 C (03:00))

08:00 Unit-3 core temperature was above 300 C, core pressure becoming high.
(reactor temperature under normal operation: 280 to 290 C)
08:20 Unit-4 was doused with 10 fire trucks by SDF (80 t) (~09:29).
14:30 Unit-5 in the state of cold shutdown (reactor water below 100 C)
15:05 Unit-2 was doused the fire trucks by TEPCO (approx. 40t) (~17:20).
18:22 Unit-4 was doused 10 fire trucks by SDF (80 t) (~19:43).
19:27 Unit-6 in the state of cold shutdown (reactor water below 100 C)
21:30 Unit-3 continuous dousing of seawater with the fire trucks by HRU
(approx. 1,137 t) (until 03:58 on March 21).

March 21 (Mon)

06:37 Unit-4 dousing with the 12 fire trucks by SDF and U.S. forces high
pressure water cannons operated by TEPCO (13 times, approx. 90t) (~
08:41).
Radiation dose before and after the operation: (2,319 => 2,126 μ Sv/h)
10:37 Injection of water to the Common Spent Fuel Pool with the fire trucks by
TEPCO (approx. 130t) (~ 15:30).
14:30 Seawater sampling nuclide analysis around unit 1-4 discharge channel
(south side) found radioactive nuclides.
15:55 Slightly grayish smoke was observed rising from unit-3 .
16:49 No change of amount of smoke from 1F Unit-3, color changed from gray
to white.
18:02 Confirmed the Unit-3 smoke has calmed down.
18:22 White haze like smoke observed rising from unit-2.

March 22 (Tue)

15:10 Unit-3 continuous dousing of seawater by HRU's fire trucks
(approx. 150 t) (~16:00).
16:19 Unit-2 dousing of seawater with the fire truck by TEPCO(approx. 18t)
(~17:01).Temperature of the spent fuel pool before and after the dousing
(53C=>51C)
17:17 Unit-4 dousing of seawater with the concrete pump truck by TEPCO
(approx. 150 t) (~20:32)
19:41 Completed switching to external power supply on 1F units-5 and 6
22:46 Lighting in the central operation room was recovered on 1F unit-3.

March 23 (Wed)

02:33 Fire extinguishing line was connected to water injection line for unit-1
reactor pressure vessel.
09:00 The reactor pressure vessel injection line was switched to the water
injection line only (shutting down the fire extinguishing system line) at
unit-1.
10:00 Unit-4 dousing of seawater with concrete pump truck by TEPCO
(approx.125 t) (~13:02).
Dose rate before and after the dousing (211.49=>224.1 μ Sv/h)
11:00 Unit-3 injection of seawater to spent fuel pool via cleanup water system
by TEPCO (approx. 35t) (~13:20)

16:20 Unit-3 generating black smoke .(Around 23:30, a TEPCO employee confirmed that the smoke had ceased.)

17:24 The residual heat removal system seawater pump shut down automatically when power supply was switched from the temporary to the permanent on unit-5. (planned to be replaced by a spare pump on March 24)

March 24 (Thu)

05:35 Unit-3 injecting seawater to the spent fuel pool via cleanup water system had been resumed by TEPCO.(approx. 120t)(~16:05)

Around 10:50 White hazy steam was found rising from the top of the reactor building at unit-1

Around 11:30 Lighting in the central operation room was recovered on unit-1.

14:25 Water (reportedly around 3-5cm deep) near the power supply panel for the high-pressure condensate pump in the basement of unit-3 turbine building registered the dose of 200mSv.

14:36 Unit-4 dousing of seawater with concrete pump trucks by TEPCO (approx. 150t) (~17:30)

15:37 External power supply for the common spent fuel pool was resumed.

16:35 Replacing the failed RHRS motor(s) to start operation at unit-5

18:05 Activated the cooling water pump for the common spent fuel pool

March 25(Fri)

06:05 Unit-4 Injection of sea water into spent fuel pool by TEPCO (coolant purifier system) (-10:20)

08:30 Seawater sampled (at the time indicated to the left) near the unit-1's south discharge canal was put to nuclide analysis and found to contain I(iodine)-131 at the density approx. 1250 times the statutory limit stipulated in the Notification of the Nuclear Reactor Regulation (around 12 times the figure detected on the previous day).

09:00 Traces of water were found indicating that water from the unit-2 reactor building may have flown from a loading entrance into the general discharge canal. (The traces indicate that water may have flown from the loading entrance to the discharge canal, but there was no actual water flow as of the evening of March 26.)

10:30 Unit-2 injection seawater to the spent fuel pool via cleanup water system had been resumed by TEPCO. (~12:19).

11:00 The switchover from seawater to freshwater (from a pure water tank) commenced in the water injection operation for unit-1, unit-2 and unit-3. (The operation must be suspended if there is any deep puddle of water on site.)

13:28 Unit-3 dousing of seawater with the fire trucks by the Kawasaki City Fire Department's emergency squad (approx. 450 t) (~16:00).

15:37 Unit-1 injection of freshwater to the reactor had been commenced.

- 15:38,15:47 Power supply for the two temporary pumps in the residual heat removal seawater system of 1F Unit-6 was switched from the temporary to the permanent.
- 18:02 Unit-3 Injection of freshwater to the reactor had been commenced.
- 19:05 Unit-4 Dousing of seawater with the concrete pump trucks by TEPCO (approx. 150 t) (~22:07).
- 23:10 3.8 million Bq of radioactivity was detected from puddles of water on the first floor of the turbine building on unit-1.
- * Results of contamination check of water in the basement of the turbine building on unit-1
- | | |
|-------------------|---|
| Cl(chlorine)-38 | Density: $1.6 \times 10^5 \text{Bq/cm}^3$ |
| As(arsenic)-74 | Density: $3.9 \times 10^2 \text{Bq/cm}^3$ |
| Y(yttrium)-91 | Density: $5.2 \times 10^4 \text{Bq/cm}^3$ |
| I(iodine)-131 | Density: $2.1 \times 10^5 \text{Bq/cm}^3$ |
| Cs(caesium)-134 | Density: $1.6 \times 10^5 \text{Bq/cm}^3$ |
| Cs(caesium)-136 | Density: $1.7 \times 10^4 \text{Bq/cm}^3$ |
| Cs(caesium)-137 | Density: $1.8 \times 10^6 \text{Bq/cm}^3$ |
| La(lanthanum)-140 | Density: $3.4 \times 10^2 \text{Bq/cm}^3$ |

March 26 (Sat)

- 10:10 Unit-2 Injection of freshwater to the reactor had been commenced.
- 14:30 Seawater sampled (at the time indicated to the left) near the south discharge canal of unit-1 was put to nuclide analysis and found to contain I(iodine)-131 at the density approx. 1850 times the statutory limit stipulated in the Notification of the Nuclear Reactor Regulation (around 1.5 times the figure detected on the previous day).
- 16:46 Lighting in the central operation room was recovered on unit-2.

March 27 (Sun)

- TEPCO announced that the radiation dose rate in excess of 1,000mSv/h was detected in the surface of water taken from puddles in the turbine building at unit-2 on March 26. Of nuclides detected in the contaminated water, iodine-134 had the density ($2.9 \times 10^9 \text{Bq/cm}^3$) approx. 10 million times its usual level in reactor core water.
- 07:30 Current treatment of puddles of water in the turbine buildings:
- unit-1: Being transported to the condenser
 - unit-2: Being prepared for transportation to the condenser
 - unit-3 and unit-4: Being considered for transportation to the condenser
- 12:34 Unit-3 Injection of seawater to the spent fuel storage pool with the concrete pump trucks by TEPCO (approx. 100 t) (~14:36)
- 15:30 The water was confirmed to be collected in the vertical parts of the trenches outside of turbine buildings of units-1 to-3. The dose rates on the water surface were 0.4 mSv/h at unit-1, over 1,000 mSv/h at unit-2 and not measurable at unit-3 because of the rubble.
- 16:55 Unit-4 Injection of seawater to the spent fuel storage pool with concrete pump trucks by TEPCO (approx. 125 t) (~19:25)

18:31 The pump for the fresh water injection to RPV of unit-2 was switched from the fire pump trucks to the temporary motor-driven pump. The source of water was also switched from a temporary tank to a pure water tank.

March 28 (Mon)

Some analysis of soil samples collected on March 21 and 22 from five locations inside of the 1F site, Plutonium-238,-239 and -240 were detected. (Their density was equivalent to the fallout observed in Japan following an atmospheric nuclear test in the past. However, in view of the isotope ratio of the detected Plutonium-238 against Plutonium -239 and Plutonium-240, the Plutonium found in two of the five samples may have come from this accident.)

Nuclide analysis of radioactive materials in the soil will continue to be carried out.

00:07 Regarding the result of the concentration measurement in water puddles at unit-2, announced by TEPCO on March 27, TEPCO corrected that as the result of re-evaluation, judging the measured value of Iodine-134 was wrong, the density of Iodine-134 was actually below the detection limit (while upholding the water surface dose rate of 1,000mSv/h).

17:40 Began transferring puddle water at unit-3 from the condensate storage tank to the surge tank.

20:30 The pump for the fresh water injection to RPV of unit-3 was switched from the fire pump trucks to the temporary motor-driven pump.

March 29 (Tue)

08:32 Unit-1 injection of freshwater into RPV commenced upon completion of the switchover from the fire pump truck to the temporary motor-driven pump.

11:50 Lighting in the central operation room was turned on unit-4.

14:17 Unit-3 injection of freshwater into the spent fuel pool with concrete pump trucks by TEPCO (approx. 100 t). (~18:18)

16:30 Unit- 2 injection of cooling water into the spent fuel pool, switched to use freshwater with the temporary motor pumps.

16:36 A puddle of water was found at a centralized environmental facility process main building. As a result of radioactivity analysis, it identified radiation. (12 Bq/cm³ in a full dose at a radiation controlled area and 22 Bq/cm³ in a full dose at a non-controlled area. (the adjacent boiler room))

16:45 Unit -2 water from the condensate reservoirs to a suppression pool water surge-tanks was initiated to enable water transfer from a condenser to condensate reservoirs in order to drain water from underground floor of turbine buildings into a condenser.

March 30 (Wed)

I-131 (Radioactive iodine) at the level 3,355 times higher than the statutory limit stipulated in the Notification of the Nuclear Reactor Regulation was detected in seawater sampled around the southern water discharge canal at 13:55 on March 29.

- 09:45 The temporary motor-driven pump injecting cooling water into the spent fuel storage pool of unit-2 experienced trouble, the injection pump was switched to a fire fighting pump truck. However, cracks were found in the hose, suspending the water injection operation. Workers began addressing the issues to resume water injection.
- 14:04 Unit 4 injection of freshwater into the spent fuel storage pool with concrete pump trucks by TEPCO had been commenced. (Approx. 140 t) (~18:33)
- 19:05 Unit 2 injection of freshwater into the spent fuel storage pool with the fire fighting pump had been resumed .
(Water injection suspended at around 23:50 after the water level in the fire cistern (water source) dropped.)

March 31 (Thu)

- I-131 (Radioactive iodine) at the level about 10,000 times higher than the statutory limit stipulated in the Notification of the Nuclear Reactor Regulation was detected in groundwater sampled at unit-1.
(I (iodine)-131 Density: $4.3 \times 10^2 \text{Bq/cm}^3$)
- 08:37 Finished transferring puddle water at unit-3 from the condensate storage tank to the surge tank.
- 08:51 I-131 (Radioactive iodine) at the level 4,385 times higher than the statutory reactor density limit was detected in seawater sampled around the southern water discharge canal at 13:55 on March 30.
I-131 (Radioactive iodine) at the level 1,425 times higher than the statutory limit stipulated in the Notification of the Nuclear Reactor Regulation was detected in seawater sampled around the northern water discharge canal on unit-5,-6 at 8:40 on March 30.
- 09:20 Transferring puddle water from the vertical shaft (trench)of unit-1 to the centralized environmental facility storage tank had been started(~11:25).
As a result, water level in the trench dropped by 1m (distance from the upper edge increased from 0.14m to 1.14m).
- 12:00 Draining water from underground floor of turbine buildings at unit-1, transferring water from a condensate storage tank to a suppression pool water surge-tank had started.
- 13:03 Unit-1 injection of freshwater with concrete pump trucks to cool the spent fuel pool
 - 14:04 Halted dousing (due to problems with the pump battery)
 - 14:29 Restarted dousing (due to operation improvement by battery replacement)
 - 16:04 Finished dousing the scheduled amount of water (approx. 90 t)
- 16:30 Unit-3 dousing of freshwater with concrete pump trucks to cool the spent fuel pool (approx. 105 t). (~19:33)

April 1 (Fri)

- 08:28 Unit-4 Dousing the spent fuel pool by TEPCO (concrete pump trucks) (approx. 180 t) (-14:14)

- 11:50 Finished transferring puddle water at unit-2 from the condensate storage tank to the surge tank.
- 13:40 Began transferring the water accumulated in the basement of unit-6 radwaste building to the unit-5 condenser (hot well)
- 14:56 Unit-2 Dousing spent fuel pool with freshwater through a normal operation line (approx. 70 t) (-17:05)
- 15:00 Spread 2,000 liters of anti-scattering agent around the common pool area on a trial basis (500m²) (-16:04)
- 15:58 Began transferring water from US military barge #1 to the filtered water tank (halted at 16:25 due to hose problems)

April 2 (Sat)

- 09:30 Confirmed that water exceeded 1,000 mSv/h within the pit made for power cables near the unit-2 intake. Also confirmed cracks approx. 20cm in length in the concrete lining pit, allowing water within the pit to leak into the sea through the said cracks (began preparations to halt leakage by concrete injection) (radioactive nuclides within the pit are currently being measured and analyzed)
- 09:52 Unit-3 Dousing spent fuel pool by TEPCO (concrete pump trucks) (approx. 75 t) (-12:54)
- 10:20 Injected freshwater from US military barge #1 to the filtered water tank (-16:40)
- 15:26 Finished transferring puddle water at the unit-1 turbine building from the condensate storage tank to the surge tank.
- 16:25 Began work to stop leakage from the pit near unit-2 intake by concrete injection (ended work at 19:15 due to worker dosage exceeding the threshold value (20 mSv/h))
- 17:10 Began transferring water from the unit-2 condenser to the condensate storage tank

April 3 (Sun)

- 12:18 Began the operation of units-1, 2, 3 RPV temporary motor pumps for injection after switching from power source trucks to the installed power source
- 13:47 Began work to stop water leakage for leaks within the pit near unit-2 intake, using materials such as polymer absorbers and sawdust (-14:30)
- 17:14 Unit-4 Dousing spent fuel pool by TEPCO (concrete pump trucks)
- 17:42 As the sawdust added to the pit near the unit-2 intake to prevent water leakage began to get dry, sawdust was mixed with water by a mixer truck.

April 4 (Mon)

- 07:08 Added tracer (milky white powder) to pit in order to identify release route of water leakage for leaks within the pit near the uit-2 intake (-07:11)
→ As of 09:30 on April 5, have not confirmed tracer release from intake
- 11:05 Unit-2 Injection of coolant into the spent fuel pool (-13:37)
- 17:03 Unit-3 Dousing spent fuel pool from concrete pump truck (approx. 70 t) (-19:19)

- 19:03 Releasing low-level radioactive water commenced, pooled in the Central Radioactive Waste Treatment Facility into sea via south outlet. (total output: approx. 9,070 tons)(~4/6 06:30, 4/8 14:30 – 4/10 17:40)
- 21:00 Began releasing low-level radioactive subsurface water in units-5, 6 sub drain pits into sea via release outlet

April 5 (Tue)

- Detected approx. 7.5 million times the concentration limit of iodine (I-131) from seawater taken around unit-2 bar screen (sampled at 11:50 on April 2)
- 14:15 Added tracer to gravel under pit to identify release route of water leakage for leaks within the pit near the unit-2 intake. Confirmed leaking water from cracks contained said tracer.
- 15:07 Opened holes around pit and injected coagulant (approx. 3,000 liters) as measure against water leakage for leaks within the pit near the unit-2 intake →leakage amount decreased temporarily, but returned to former rate. Injected coagulant (6,000 liters total).
- 17:35 unit-4 Dousing spent fuel pool by TEPCO (concrete pump truck) (approx. 20 t) (-18:22)

April 6 (Wed)

Soil samples collected on March 25 and March 28 within the site were analyzed and detected Plutonium-238, -239, -240. (Their density was equivalent to the fallout observed in Japan following an atmospheric nuclear test in the past. However, in view of the activity ratio of the detected Plutonium-238 against Plutonium-239 and -240, some of the detected Plutonium may have come from this accident.)

Around 05:38 Confirmed no release of liquid containing radioactive materials from concrete on sides of the pit near unit-2 intake (Confirmed the water level in unit-2 turbine building was not rising) (more work to stop water leakage will be continued)

- 22:30 Activated nitrogen injection equipment for unit-1 primary containment vessel to prevent hydrogen explosion.

April 7 (Thu)

Water level of the pit was increased by 5cm until noon.

- 01:31 Injection of nitrogen gas to unit-1 primary containment vessel commenced.
- 06:53 Dousing unit-3 by TEPCO (concrete pump truck) (approx. 70 t) (-08:53)
- 13:29 Dousing unit-2 spent fuel pool with freshwater (approx. 36 t) (-14:34)
- 18:23 Dousing unit-4 spent fuel pool with freshwater (approx. 38 t) (-19:40)
- 23:52 No significant abnormalities in units 1~6 nor significant changes in the data of the monitoring posts in the wake of the earthquake occurred at 23:32

April 8 (Fri)

17:08 Unit-3 Dousing spent fuel pool by TEPCO (concrete pump truck) (approx. 75 t) (-20:00)

April 9 (Sat)

04:10 Unit-1 Injection of nitrogen to PCV commenced by high-purity nitrogen gas generator

13:10 Completed transferring water from unit-2 condenser to the condensate storage tank

17:07 Unit-4 Dousing spent fuel pool by TEPCO (concrete pump truck) (approx. 90 t) (-19:24)

April 10 (Sun)

09:00 Cleaned rubble within site with remote-controlled heavy machinery (-17:00)

09:30 Completed transferring water from unit-1 condenser to the condensate storage tank

10:37 Unit-2 Injected coolant into spent fuel pool (-12:38)

17:15 Unit-3 Injected coolant (approx. 80 t) into spent fuel pool (-19:15)

April 11 (Mon)

10:45 Completed redundant silt fence building for south side breakwater to prevent spread of contaminated water

17:16 External power lost for unit-1 & 2, core injection pump for unit-1-3 shut down, and unit-1 nitrogen gas injection pump shut down due to earthquake at around 17:16

17:40 Unit-1, 2 Core injection pump shut down due to loss of external power

17:56 Unit-1, 2 External power restored

17:59 Unit-3 Core injection pump shut down

18:04 Unit-1~3 Core injection pump restarted

23:19 Unit-1 Restarted nitrogen gas injection valve opening work
23:24 Nitrogen gas injection valve opened

April 12 (Tue)

06:38 Confirmed fire at panel housing batteries within intake sampling building for unit-1-4 near the south discharge canal on the south side

09:12 Confirmed fire extinguished

10:00 Unit-4 Sampled water from spent fuel pool to grasp condition of fuel in the pool (water temperature: approx. 90°C; radiation dose: approx. 84mSv/h from about 6m above floor of reactor building 5F)

11:20 NISA announced The Rating of the International Nuclear and Radiological Event Scale (INES) on the events in unit-1~3 was temporarily assessed as Level 7. (Accident with wider consequences)

16:26 Unit-3 Doused of fresh water (approx. 35 t) with concrete pump trucks to cool spent fuel pool (-17:16)

19:35 Unit-2 Began transferring accumulated water in turbine building from the trench to the condenser via underwater pump (4/12 19:35~4/13 11:00 temporary shutdown due to leak checks)

April 13 (Wed)

- 00:30 Unit-4 Doused of freshwater with concrete pump trucks to cool spent fuel pool (-06:57) (approx. 195 t)
- 08:30 Unit-2 Installed 2 temporary steel water bars (for total of 3 bars) on ocean side of bar screen (- around 10:00)
- 13:15 Unit-2 Injected water (approx. 60 t) into spent fuel pool (-14:55)
- 13:50 Units-3, 4 Completed building silt fence in front of screen to prevent spread of contaminated water
- 15:02 Unit-2 Restarted transfer of highly radioactive puddle water in trench of turbine building to condenser
- 17:04 Unit-2 Halted transfer of highly radioactive puddle water in trench of turbine building to condenser(actual water transferred: approx. 660 t)

April 14 (Thu)

- 12:20 Units-1, 2 Completed building silt fence in front of screen and intake
- 15:56 Unit-3 Dousing spent fuel pool with concrete pump truck (approx. 25 t) (-16:32)

April 15 (Fri)

- Completed transfer of the temporary diesel generator and pump control panel for the pump injecting water to the reactor to higher ground as a countermeasures of tsunami
- 14:15 Unit-2 Completed installation of iron plates on the ocean-side of inlet bar screen room (4 steel plates out of 7)
- 14:30 Unit-4 Dousing spent fuel pool with concrete pump trucks (approx. 140 t) (-18:29)
Placed 3 sandbags filled with 100kg zeolite between inlet screen pump rooms of unit-3 and unit-4 (-15:45)

April 16 (Sat)

- 10:13 Unit-2 Injection of freshwater (approx. 45 t) to spent fuel pool via the spent fuel pool cooling line (-11:54)

April 17 (Sun)

- 09:00 Placed a total of 7 zeolite sandbags (-11:15)
 - 2 zeolite sandbags between inlet screen pump rooms of unit-1, 2
 - 5 zeolite sandbags between inlet screen pump rooms of unit-2, 3
- 11:30 Surveyed the current situation of the inside of the nuclear reactor building of unit-1,3 with remote-controlled robot (-17:30)
- 14:34 Common spent fuel pool power supply was stopped due to short-circuiting of the end of the power supply circuit. →power supply was restored at 17:30
- 17:39 Unit-4 Dousing spent fuel pool (approx. 140 t) with concrete pump trucks (-21:22)

April 18 (Mon)

- 09:30 Unit-2 Injected coagulant (liquid glass) into power source trench (approx. 17,000L) (-17:40)
- 13:28 Units-1 to 3 Confirmed startup condition of injection pump after replacing the hose used for water injection to the reactors with a new one

Shutdown periods for injection pump due to hose replace →
Unit-1: 11:50 – 12:12, Unit-2: 12:13 – 12:37, Unit-3: 12:38 – 13:05
14:17 Unit-3 Dousing spent fuel pool (approx. 30 t) (-15:02)
17:40 Completed leak tests for radioactive water transfer line between unit-2
and the central radioactive waste treatment facility
19:00 Completed temporary piping, power source installation, and watertight
work in order to transfer waste liquid to the central radioactive waste
treatment facility

April 19 (Tue)

08:00 Unit-2 Injected coagulant (liquid glass) into power source trench
(approx. 7,000L) (-15:30)
10:08 Unit-2 Began transferring puddle water (highly radioactive puddle water)
in turbine building trenches to central radioactive waste treatment facility
10:17 Unit-4 Dousing spent fuel pool (approx. 40 t) with concrete pump trucks
(-11:35)
10:23 Connected transmission cable to external power, proceeded power
receipt testing, completed linkage line installation work
(connected transmission cables to external power sources between
units-1, 2 and units-3, 4 for power source redundancy)
11:00 Unit-6 Transferred puddle water in turbine building basement (approx.
100m³) to condenser (-15:00)
16:08 Unit-2 Injection of water (approx. 47 t) into spent fuel pool (-17:28)

April 20 (Wed)

9:51 Unit-6 Temporarily stopped the pump of residual heat removal system
(RHR) in order to change position of temporary hoses for residual heat
removal seawater (RHRS) system
After carrying out the work of transferring of the pump for temporary
Residual Heat Removal (RHR), cooling was resumed (15:56)
17:08 Unit-4 Dousing spent fuel pool (approx. 100 t) with concrete pump trucks
(-20:31).

April 21 (Thu)

- Completed seal reinforcement work on leak areas using grout
- Estimated that the amount of highly radioactive contaminated water
leaked from cracks in the concrete near the unit-2 intake screen
confirmed on April 2 was approx. 520m³, with dosage of approx. 4.7×10^{15} Bq

17:14 Unit-4 Dousing spent fuel pool (approx. 140 t) with concrete pump trucks
(-21:20)

April 22 (Fri)

13:40 Unit-3 Injection of water (approx. 10 t) into spent fuel pool (-14:00)
14:19 Unit-3 Dousing spent fuel pool (approx. 50 t) with concrete pump trucks
(-15:40)
15:55 Unit-2 Injection of water (approx. 50 t) into spent fuel pool (-17:40)

17:52 Unit-4 Dousing spent fuel pool (approx. 200 t) with concrete pump trucks (-23:53)

→ Temperature of spent fuel pool water (approx. 91°C before dousing)

April 23 (Sat)

12:30 Unit-4 Dousing spent fuel pool (approx. 140 t) with concrete pump trucks (-16:44)

→ Temperature of spent fuel pool water (approx. 83°C → approx. 66°C)

April 24 (Sun)

12:25 Unit-4 Dousing spent fuel pool (approx. 165 t) with concrete pump trucks (-17:07) → Temperature of spent fuel pool water (approx. 86°C → approx. 81°C)

April 25 (Mon)

10:12 Unit-2 Injection of fresh water into spent fuel pool via the spent fuel pool cooling (FPC) system (approx. 38 t) (-11:18)

10:57 Units-1~3 Due to enhancement work of external power supply, the power supplies to the motor-driven pumps injecting fresh water to the Reactor Pressure Vessel was switched from external power supplies to temporary diesel generators.

18:15 Unit-4 Dousing spent fuel pool (approx. 210 t) with concrete pump trucks to cool spent fuel pool (-24:26)

April 26 (Tue)

12:22 Unit-5 Temporary stopped the pump of residual heat removal system (RHR) due to enhancement work of external power supply (-16:43)

12:25 Unit-3 Injection of fresh water (approx. 47.5 t) into spent fuel pool (-14:03)

13:30 Unit-3 Began full-scale distribution of anti-scattering agent (5,000m²) on ocean side of turbine building (-17:00)

16:50 Unit-4 Dousing of spent fuel pool (approx. 130 t) with concrete pump trucks to cool spent fuel pool (-20:35)

April 27 (Wed)

10:02 Unit-1 Began operation to incrementally increase reactor injection ratio from approx. 6m³/h to a maximum of approx. 14m³/h

12:18 Unit-4 Began dousing with concrete pump trucks (approx. 85 t) to cool spent fuel pool (-14:01 halted, 14:32 restarted – 15:15 finished)

April 28 (Thu)

10:15 Unit-2 Injected fresh water into spent fuel pool (approx. 43 t) (-11:28)

11:55 Unit-4 Sampling of pool water (-12:07)

April 29 (Fri)

10:14 Unit-1 Changed reactor water injection ratio from 10m³/h to 6m³/h

11:36 Unit-1 Inspected conditions at reactor building 1F with remote controlled robot to confirm whether significant water leakage was present in primary containment vessel (-14:05)

April 30 (Sat)

12:08 Units-3, 4 Completed external power increase work (power received from

Ookuma line 3L).

Around 14:05 Unit-2 Restarted transfer of water from turbine building trench pit to collective waste processing facility

May 1 (Sun)

13:35 Unit-2 Began trench pit closing work

14:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 120m³) to temporary tanks(-17:00)

May 2 (Mon)

10:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 220m³) to temporary tanks (-16:00)

10:05 Unit-2 Injected fresh water into spent nuclear fuel pool (approx. 55t) (-11:40)

12:58 Units-1~3 Installed alarm onto core injection pump (-14:53)

15:03 Units-5, 6 Trial power supply work on startup transformer (5SB) as part of permanent power supply restoration work (-15:03)

May 3 (Tue)

14:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 114m³) to temporary tanks

May 4 (Wed)

09:40 Unit-2 Performed concrete casting as part of trench sealing work (80m³) (-15:45)

10:09 Unit-3 Changed reactor injection ratio from approx. 7m³/h to 9m³/h in conjunction with reactor pressure vessel temperature increase

May 5 (Thu)

12:19 Unit-4 Began dousing of spent fuel pool with concrete pump trucks (-20:46)

16:36 Unit-1 Began ventilation of reactor building via full operation of local exhaust fans (6 units) in order to improve reactor building working environment

May 6 (Fri)

02:04 Earthquake occurs – epicenter at Hamadori, Fukushima (max. JMA seismic intensity 5-lower). No abnormalities at 1F, 2F.

09:36 Unit-2 Injection of water into spent fuel pool with temporary motorized pump (-11:16)

10:01 Unit-1 The ratio of water injection for submersion of reactor containment vessel was increased from approx. 6m³/h to approx. 8m³/h

12:38 Unit-4 Dousing spent fuel pool (180t) with concrete pump trucks (-17:51)

14:00 Unit-6 Transfer of puddle water in the basement of turbine building (120m³) to temporary tanks was resumed (-17:00)

May 7 (Sat)

09:22 Unit-3 Temporarily halted transfer of radioactive waste liquid from unit-2 turbine building to the central radioactive waste treatment facility for reactor injection piping work (transfer restarted at 16:02)

10:00 Unit-6 Began transfer of puddle water from turbine building to temporary

tank (-15:00)

14:05 Unit-4 Began dousing (approx. 120t) with concrete pump trucks (-17:30)

May 8 (Sun)

12:10 Unit-3 Injected water into spent fuel pool using temporary motorized pump (approx. 60t) (-14:10)

16:18 Unit-3 Began draining water from condenser into ground in the basement of turbine building

20:08 Unit-1 Disconnected ducts penetrating the double-entry doors into the reactor building and partially opened them

May 9 (Mon)

04:01 Unit-1 Performed sampling, retrieved exhaust ducts (-04:17)

04:17 Unit-1 Opened the double-entry doors of the reactor building

04:18 Unit-1 Began entry of workers into reactor building for reactor building internal environment survey

All workers left after first survey was completed. Max. exposure dose of entered workers: 10.5mSv (-04:47)

05:00 Unit-1 Measured atmospheric dose rate after opening double-entry doors of the reactor building; no effect on nearby areas

12:14 Unit-3 Injected fresh water into spent fuel pool (12:39 – 14:36, (approx. 80t) also injected corrosion inhibitor (hydrazine, approx. 0.5m³)) (-15:00)

14:00 Unit-6 Transfer of puddle water in the basement of turbine building to temporary tanks was resumed

16:05 Unit-4 Dousing spent fuel pool using water (16:11 – 18:38, (approx. 100t) also injected hydrazine (approx. 0.23m³)) with concrete pump trucks (-19:05)

May 10 (Tue)

09:01 Unit-2 Temporarily halted transfer of high level radioactive waste liquid from turbine building trench to collective treatment facility (due to unit-3 reactor water injection line replacement work)

09:31 Unit-3 Began installing transfer line on turbine building side

10:00 Unit-6 Restarted transfer of puddle water in the basement of turbine building to temporary tanks (-16:00)

11:00 Unit-6 Transferred puddle water in the basement of reactor building (approx. 10m³) to Unit-6 radwaste processing building (-12:30)

13:09 Unit-2 Injected fresh water into spent fuel pool (13:19 – 14:35, (approx. 56t) also injected corrosion inhibitor (hydrazine, approx. 1.2m³)) (-14:45)

May 11 (Wed)

Unit-3: Welded sealing plug onto feedwater line

08:47 Units-1 - 3 Due to partial power supply shutdown caused by restoration of the Okuma Power Line 2, reactor injection pump power source was switched to temporary diesel generator for reactor injection pump operation

- 08:50 Unit-1 Shut down reactor containment vessel nitrogen gas supply equipment due to partial power supply shutdown caused by restoration of the Okuma Power Line 2
- 10:00 Unit-6 Restarted transfer of puddle water from turbine building to temporary tank (approx. 120m³) (-16:00)
- 11:00 Unit-6 Transferred puddle water in the basement of turbine building to unit-6 waste processing building (approx. 10m³) (-13:30)
- 12:30 Unit-3 Discovered water leakage into cable pit near screen equipment
Since the water level within the pit did not increase, both confirming source of leakage into the pit and nuclides analyzing are taken in action.
- 15:55 Units-1 - 3 Due to completion of Okuma Power Line 2 restoration (15:20), switched reactor injection pump power source from temporary diesel generator to system power source
- 15:58 Unit-1 Restored reactor containment vessel nitrogen gas supply equipment
- 16:07 Unit-4 Dousing spent fuel pool (16:14 – 19:36 (approx. 120t) hydrazine injected) (-19:38)
- 18:45 Unit-3 Confirmed leak stoppage for water leak into pit on south screen room via measures such as concrete injection until 18:40

May 12 (Thu)

- 05:00 Unit-1 Confirmed reactor water level for fuel boundary A is beneath the scale
- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 120m³) (-16:00)
- 10:30 Unit-6 Transferred puddle water in the basement of reactor building to unit-6 radwaste processing building (approx. 7.5m³) (-13:30)
- 12:20 Completed station power source switching due to Okuma Power Line 3 restoration
- 15:20 Unit-2 Restarted transfer of high level radioactive waste liquid from turbine building trench to collective waste processing facility
- 16:53 Unit-3 Began injection of water into reactor pressure vessel from feedwater system at rate of 3m³/h (injection of water from fire extinguishing system remains unchanged)

May 13 (Fri)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 100m³) (-15:00)
- 11:30 Unit-6 Transferred puddle water in the basement of reactor building to unit-6 radwaste processing building (approx. 3.3m³) (-13:15)
- 16:04 Unit-4 Dousing spent fuel pool (16:20 – 18:41 injected 0.12m³ of hydrazine) (approx. 100 tons) (-19:04)

May 14 (Sat)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 100m³) (-15:00)
- 13:00 Unit-2 Injected water into spent fuel pool (approx. 56 t) (-14:37)

May 15 (Sun)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 100m³) (-15:00)
- 13:28 Unit-1 Increased reactor injection ratio from 8m³/h to 10m³/h in order to monitor trends of parameters for reactor pressure vessel and reactor containment vessel after reactor injection ratio increase
- 14:33 Unit-3 Injected 5 sodium borate into reactor via fire extinguishing line (approx. 180kg) (-17:00)
- 16:25 Unit-4 Dousing spent fuel pool (16:26 – 18:30 injected 0.30m³ of hydrazine) (approx. 140 t) (-20:25)

May 16 (Mon)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 80m³) (-14:00)
- 15:00 Unit-3 Injected fresh water into spent fuel pool via FPC system line (approx. 106 t) (15:10 - 17:30 hydrazine injection approx. 0.88m³) (-18:32)

May 17 (Tue)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tanks (approx. 80m³) (-17:00)
- 10:11 Unit-3 Increased reactor injection ratio (feedwater system: 6 9m³/h, extinguisher system remains at 9m³/h, total: 18m³/h)
- 11:50 Unit-1 Changed reactor injection ratio from approx. 10m³/h to approx. 6m³/h
- 16:14 Unit-4 Dousing spent fuel pool with freshwater (approx. 120 t) (16:40 – 18:35 hydrazine injection approx. 0.6m³) (-20:06)
- 18:04 Unit-3 Began transferring puddle water in the basement of turbine building to collective waste processing facility

May 18 (Wed)

- 09:24 Unit-2 Entered reactor building to measure dosage
- 10:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 80m³) to temporary tanks (-14:00)
- 10:30 Unit-6 Transferred puddle water in the basement of reactor building (approx. 10.5m³) to unit-6 waste processing building (-12:30)
- 13:10 Unit-2 Injected fresh water to spent fuel pool via FPC system line (approx. 53 t) (13:15 – 14:30 hydrazine approx. 1.1m³) (-14:40)
- 16:30 Unit-3 Conducted pre-inspection of reactor building to confirm current state of nitrogen sealing work area (-16:40)

May 19 (Thu)

- 16:30 Unit-4 Dousing spent fuel pool with fresh water (approx. 100 t) (-19:30)

May 20 (Fri)

- 09:30 Unit-1 Entered reactor building to monitor water level and measure dosage (-12:15)
- 14:15 Unit-3 Increased reactor injection ratio via feedwater system from 9 to 12m³/h
- 15:06 Unit-1 Dousing spent fuel pool with fresh water (approx. 50 t) (-16:15)

17:39 Unit-3 Changed reactor injection ratio via extinguishing system from 9 to 6m³/h

May 21 (Sat)

14:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 80m³) to temporary tank (-18:00)

16:00 Unit-4 Dousing with fresh water (approx. 130 t) (16:23 – 19:00 hydrazine approx. 0.4m³) (-19:56)

May 22 (Sun)

13:02 Unit-2 Injection of fresh water (approx. 56 t) from fuel pool cooling cleanup system to spent fuel pool (13:04 – 14:03 hydrazine approx. 1.0m³) (-14:40)

15:33 Unit-1 Dousing spent fuel pool with fresh water (approx. 90 t) (-17:09)

May 23 (Mon.)

11:31 Unit-3 Changed reactor injection ratio via extinguishing system from 6 to 5m³/h

14:08 Unit-3 Changed reactor injection ratio via extinguishing system from 5 to 4m³/h

16:00 Unit-4 Dousing spent fuel pool with fresh water (approx. 100 t) (16:08 – 18:30 hydrazine approx. 0.3m³) (-19:09)

May 24 (Tue)

09:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 400m³) to temporary tank (-19:00)

10:15 Unit-3 Injected fresh water (approx. 100 t) into spent fuel pool via FPC system line (10:20 – 12:56 hydrazine approx. 0.8m³) (-13:35)

May 25 (Wed)

09:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 336m³) to temporary tank (-19:00)

09:05 Unit-2 Temporarily halted transfer of highly radioactive puddle water from turbine building trench to collective waste processing facility due to power source switching (-15:30)

09:14 Unit-1 Temporarily halted nitrogen sealing of reactor containment vessel due to power source switching (09:14 - 9:18, 15:16 - 15:18)

15:45 Unit-1 Confirmed shutdown of nitrogen supply compressor. Began sealing upon switching to reserve unit (19:44)

16:36 Unit-4 Injection of spent fuel pool with fresh water (approx. 121 t) (16:42 – 18:49 hydrazine approx. 0.3m³) (- 13:35)

May 26 (Thu)

10:06 Unit-2 Injected fresh water (approx. 53 t) into spent fuel pool via FPC system line (10:10 – 11:10 hydrazine injection) (-11:36)

14:45 Unit-2 Transferred condenser water to turbine building due to reactor pressure vessel water injection piping work (-5/27 14:30)

May 27 (Fri)

09:00 Unit-6 Transferred puddle water in the basement of turbine building (approx. 336.6m³) to temporary tank (-19:00)

- 10:30 Unit-1 Attached water level meter for puddle water in reactor building, sampled underground puddle water, and installed hose for spent fuel pool
- 17:05 Unit-4 Dousing with fresh water (approx. 100 t) (-20:00)

May 28 (Sat)

- 09:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-19:00)
- 10:20 Unit-6 Transferred puddle water in the basement of reactor building (approx. 12m³) to Unit-6 waste processing building (-12:10)
- 13:28 Unit-3 Injected fresh water (approx. 50 t) into spent fuel pool via FPC system line (-15:08)
- 16:47 Unit-1 Conducted leak test in order to inject fresh water into spent fuel pool via FPC system line to spent fuel pool (-17:00)
- 17:56 Unit-4 Dousing with fresh water (approx. 60 t) (-19:45)
- 20:54 Unit-3 Halted injection of water from extinguishing system piping into reactor (injection of water from feedwater system into core (approx. 13.5m³/h))
- 21:14 Unit-5 Confirmed shutdown of residual heat removal seawater (RHRS) system pump. Began switch to reserve pump (5/29 8:12); RHRS pump started up (5/29 12:31); Cooling of core with residual heat removal (RHR) system had been resumed (5/29 12:49)

May 29 (Sun)

- 09:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-19:00)
- 11:10 Unit-1 Injection of fresh water (approx. 168 t) into spent fuel pool from FPC system (-15:35)
- 11:33 Unit-2 Began injection of water into core from feedwater system (approx. 5m³/h) in addition to injection of water into core from extinguishing system (7m³/h)

May 30 (Mon)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-17:30)
- 11:15 Unit-2 Leak testing of spent fuel pool alternative cooling equipment secondary system. Began trial operation of said system (May 30, 15:02).
- 12:06 Unit-2 Injection of fresh water (approx. 53 t) into spent fuel pool from FPC system (-13:52)
- 18:05 Unit-2 Halted injection of water into reactor from extinguishing system piping (continued injection of approx. 5m³/h from feedwater system)

May 31 (Tue)

- Around 08:00 Confirmed oil leakage into sea near curtain wall of units-5, 6 intake at dedicated port . Installed absorption mat and oil fence near seawall (Around 14:00 and at 16:50)
- Around 09:00 Unit-3 Preliminary survey of reactor building by remote controlled robot (- Around 16:00)

- 11:40 Unit-2 Leak testing of spent fuel pool alternative cooling equipment primary system, began full operation of said unit (May 31, 17:21)
- Around 14:30 Unit-4 Confirmed loud noise while wireless controlled unmanned heavy machinery was cleaning debris outside the south side of the reactor building. Later confirmed that said noise was caused by rupture of oxygen tank buried in the rubble.
- 20:30 Unit-1 Changed reactor injection ratio from approx. 6m³/h to approx. 5m³/h

June 1 (Wed)

- 10:10 Unit-3 Changed reactor injection ratio from approx. 13.5m³/h to approx. 12.5m³/h (May 31 10:19), then from approx. 12.5m³/h to approx. 11.5m³/h
- 14:00 Unit-6 Began transfer of puddle water in the basement of turbine building to temporary tank
- 14:34 Unit-3 Injection of fresh water (approx. 40 t) into spent fuel pool from FPC system (14:41 – 15:26 also injected approx. 0.14m³ of hydrazine) (-15:54)

June 2 (Thu)

- 12:50 Unit-3 Transferred condenser water to condensate storage tank in preparation for transfer of puddle water in the basement of turbine building to condenser (-June 4, 21:56)
- 14:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (- June 8, 18:00) (temporarily halted on June 5 from 14:00 – 14:45)

June 3 (Fri)

- 13:16 Unit-3 Temporarily halted coolant injection due to core injection supply line route change work (-13:32)
- 13:49 Unit-2 Temporarily halted coolant injection due to core injection supply line route change work (-14:09)
- 14:35 Unit-4 Dousing spent fuel pool with fresh water (approx. 210 t) (-21:15)
- Around 15:00 Unit-1 Confirmed state of reactor building using remote-controlled robot (- Around 17:00)
- 18:39 Unit-2 Transferred highly radioactive puddle water from turbine building trench to condenser hot well inside turbine building (- June 4, 12:28)

June 4 (Sat)

- 09:57 Unit-1 Temporarily halted coolant injection due to core injection supply line route change work (-13:56)
- 10:02 Unit-1 Injection of water into core from extinguishing pump (-13:43)
- 14:23 Unit-4 Dousing spent fuel pool with fresh water (approx. 180 t) (-19:45)
- 18:39 Unit-2 Transferred highly radioactive puddle water within turbine building trench to collective waste processing facility (process main building) (- June 16, 8:40)

June 5 (Sun)

- 10:16 Unit-1 Injection of fresh water into spent fuel pool from FPC system (approx. 15 t) (-10:48)
- 13:08 Unit-3 Injection of fresh water (approx. 60 t) into spent fuel pool from FPC system (-15:14)
- 18:26 Unit-3 Transferred puddle water within turbine building to condenser (-June 9, 10:44)

June 6 (Mon)

- 15:56 Unit-4 Dousing spent fuel pool with fresh water (approx. 90 t) (-18:35)

June 8 (Wed)

- 10:05 Unit-6 Transferred puddle water in the basement of reactor building (approx. 17m³) to Unit-6 waste processing building (-12:40)
- 17:54 Unit-1 Temporarily halted nitrogen provision due to confirmation of increase in nitrogen provision equipment pressure (14:57); restarted nitrogen provision due to restoration of power source for said equipment
- 16:12 Unit-4 Dousing spent fuel pool with fresh water (approx. 102 t) (-19:14)

June 9 (Thu)

- 09:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-18:00)
- Around 10:30 Units-2, 3 Conducted trial water sending of recirculating seawater purification unit installed in screen area (- around 15:00)
- 13:42 Unit-3 Injected fresh water (approx. 55 t) from FPC system to spent fuel pool (-19:14)

June 10 (Fri)

Conducted closing work in 39 locations as part of puddle water leakage prevention measures for the screen pit of each Unit

June 11 (Sat)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-15:00)
- 11:45 Unit-2 Conducted trial operation of reactor building local exhaust fans (-12:19), opened double doors (12:39), began full scale operation (12:42)
- 15:30 Unit-3 Transferred puddle water in the basement of turbine building to collective waste processing facility (-June 12, 17:01)

June 12 (Sun)

- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-15:00)
- 10:09 Unit-3 Injected fresh water from FPC system into spent fuel pool (-11:48)

June 13 (Mon)

- 10:00 Units-2, 3 Began full scale operation of recirculating seawater purification unit installed in screen area
- 10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-16:00)
- 14:58 Unit-2 Transferred Unit-1 condenser water (approx. 75 t) to Unit-1 turbine building basement in preparation for transfer of turbine building puddle water to Unit-1 condenser(-17:43)

16:36 Unit-4 Dousing spent fuel pool with fresh water (approx. 150 t) (-21:00)

June 14 (Tue)

03:45 Performed trial operation of puddle water processing system cesium absorption unit using low-level contaminated water (-14:00)

10:00 Unit-6 Transferred puddle water in the basement of turbine building to temporary tank (-16:00)

10:05 Unit-3 Transferred puddle water in turbine building to collective waste processing facility (-June 16, 8:46)

16:10 Unit-4 Dousing spent fuel pool with fresh water (approx. 150 t) (-20:52)

June 15 (Wed)

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)

10:06 Unit-1 Changed reactor injection ratio from approx. 5m³/h to approx. 4.5m³/h (-20:52)

10:33 Unit-1 Transferred condenser water to condensate storage tank (-June 16, 9:52)

11:55 Unit-6 Transferred puddle water in basement of reactor building to unit-6 waste processing building (-14:00)

13:10 Trial operation of decontamination unit in the water treatment facility was conducted (-around 20:35)

Around 22:40 Combined operation of cesium adsorption unit and decontamination unit was conducted (-June 16, around 00:20)

June 16 (Thu)

Around 00:20 Began combined continuous operation of cesium adsorption unit and decontamination unit

10:00 Unit-6 Began transferring puddle water in basement of turbine building to temporary tank

13:14 Unit-4 Injected fresh water (approx. 75 t) into spent fuel pool (-15:44)

Around 19:20 Temporarily halted continuous operation of water treatment facility due to cesium adsorption unit leakage

June 17 (Fri)

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)

10:19 Unit-3 Injected fresh water (approx. 49 t) into spent fuel pool from FPC system (-11:57)

14:20 Unit-2 Began transferring highly radioactive puddle water in turbine building trench to turbine building condenser hot well; temporarily halted transfer due to transfer pump malfunction (14:59)

20:00 Began full-scale operation of water treatment facility

June 18 (Sat)

00:54 Temporarily halted operation of water treatment facility due to cesium adsorption unit filter surface dose rate reaching exchange standard levels

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)

10:00 Temporarily halted operation of recirculating seawater purification unit for maintenance (-June 20, around 10:00)
13:31 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (-June 20, 00:02)
16:05 Unit-4 Injected fresh water (approx. 99 t) into spent fuel pool (-19:23)
Around 21:00 Confirmed water leakage during exchange preparation work for water treatment facility adsorption tower

June 19 (Sun)

09:14 Unit-4 Filled device storage pool (DSP) with water (approx. 80 t) (-11:57)
10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
Conducted the following tasks in preparation for halted of Okuma Power Line 2 due to repairs on gateway building between Units-1, 2:

- Unit-1 Temporarily switched core injection pump power source to an emergency diesel generator (10:35 – 15:47), temporarily halted nitrogen sealing (11:48 – 16:05)
- Unit-2 Temporarily switched core injection pump power source to an emergency diesel generator (10:49 – 15:35), temporarily halted spent fuel pool alternative cooling unit (11:03 – 16:00), temporarily halted local exhaust fan (12:12 – 16:22)
- Unit-3 Temporarily switched core injection pump power source to D/G (11:03 – 15:22), temporarily halted temporary Units-1/2 M/C (A), (B) and power center 2C (13:09 – 15:09) – received power from Okuma Power Line 3 in the meantime

19:30 Conducted trial water sending using highly radioactive contaminated water of cesium adsorption unit (-23:45)
20:46 Unit-2 Entered reactor building
20:51 Unit-2 Slightly opened one door and fully opened the other of reactor building double doors (June 20, 05:00)

June 20 (Mon)

09:49 Unit-4 Filled device storage pool (DSP) with water (-09:52) (10:06 - June 21, 11:29)
10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
10:25 Conducted trial water sending using highly radioactive contaminated water of cesium adsorption unit (-14:50)
13:37 Unit-2 Transferred puddle water in turbine building trench to Unit-1 condenser (-June 21, 17:09)
14:30 Unit-2 Opened external doors of reactor building large freight entrance

June 21 (Tue)

00:45 Began trial operation of water treatment facility
07:20 Halted trial operation of water treatment facility due to shutdown of coagulation equipment solution injection unit

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
10:02 Unit-1 Changed reactor injection ratio from approx. 4.5m³/h to approx. 4.0m³/h
10:04 Unit-2 Changed reactor injection ratio from approx. 5.0 m³/h to approx. 4.5m³/h
10:06 Unit-3 Changed reactor injection ratio from approx. 11.0 m³/h to approx. 10.0m³/h
11:05 Unit-6 Transferred puddle water in basement of reactor building to Unit-6 waste processing building (-13:30)
11:45 Unit-4 Filled device storage pool (DSP) with water (-12:52)
11:55 Unit-1 Temporarily halted nitrogen sealing due to temporary transformer installation work (-18:03)
13:15 Unit-2 Entered reactor building, performed measurement device calibration and pre-inspection of nitrogen sealing locations
15:32 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (-June 27, 15:44)

June 22 (Wed)

08:32 Unit-4 Filled device storage pool (DSP) with water (-14:31)
09:56 Unit-2 Began transferring puddle water in turbine building trench to collective waste processing facility
10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
10:02 Unit-1 Changed reactor injection ratio from approx. 4.0m³/h to approx. 3.5m³/h
10:04 Unit-2 Changed reactor injection ratio from approx. 4.5m³/h to approx. 4.0m³/h
10:20 Halted operation of water treatment facility due to flushing work (- June 23, 00:13)
14:31 Unit-4 Injected freshwater into spent fuel pool (-16:38)

June 23 (Thu)

00:43 Began trial operation of water treatment facility
09:32 Unit-4 Filled device storage pool (DSP) with water (-15:29)
10:13 Unit-3 Changed reactor injection ratio from approx. 10.0 m³/h to approx. 9.5m³/h
10:36 Unit-2 Performed temporary reactor pressure gauge installation (-12:26)
13:00 Temporarily halted trial operation of water treatment facility due to exchange cesium adsorption tower (-14:44)
18:27 Units-1, 2 Began injection of fresh water into reactor for Units-1, 2 using Unit-1 reactor injection pump

June 24 (Fri)

Unit-2 Halted basement puddle water level meter installation work using robots

Around 06:58 Unit-2 Unmanned helicopter which was collecting dust rising from reactor building opening performed forced landing onto reactor building roof

10:00 Temporarily halted trial operation to exchange water treatment facility cesium adsorption tower (-12:50)

10:07 Unit-3 Changed reactor injection ratio from approx. 9.5m³/h to approx. 9.0 m³/h

10:30 Unit-3 Performed dosage survey using robot for reactor building (-12:42)

Around 12:50 Began processing using fresh water processing unit

16:35 Unit-5 Began cooling of spent fuel pool using FPC system

June 25 (Sat)

10:00 Temporarily halted recirculating seawater purification unit due to maintenance

10:00 Temporarily halted trial operation of water treatment facility due to exchange cesium adsorption tower (-15:00)

15:24 Automatic shutdown of water treatment facility due to oil separator water level low alarm

16:10 Automatic shutdown of water treatment facility due to oil separator water level low alarm

16:35 Restarted trial operation of water treatment facility

June 26 (Sun)

09:56 Unit-3 Injected boron water (approx. 45 t) from FPC system to spent fuel pool

10:00 Temporarily halted trial operation of water treatment facility due to exchange cesium adsorption tower vessel (-18:10)

16:20 Units-1 through 3 Began using water processed at water processing system alongside injection from filtered water tank for injection into reactor

June 27 (Mon)

Performed the following work due to station power source switch in line with Okuma power line 2 restoration:

- 08:23 Unit-2 Temporarily shut down spent fuel pool alternative cooling equipment (-16:53)
- 08:51 Unit-1 Temporarily shut down nitrogen sealing equipment (-15:07)
- 09:02 Unit-2 Shut down turbine building trench puddle water transfer pump to the collective waste processing facility (-17:07)

15:00 Unit-3 Injected boron (approx. 60 t) into spent fuel pool from FPC system (-17:18)

17:00 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (two pumps) (-June 28, 9:58)

17:55 Halted supply of processed water of water treatment facility due to discovery of leakage from piping

18:03 Unit-5 Began operation of emergency diesel generator 5A, restoring it to standby condition

June 28 (Tue)

- 09:40 Unit-4 Filled device storage pool (DSP) with water (-15:29)
- 11:00 Unit-6 Transferred puddle water in basement of reactor building to Unit-6 waste processing building (-13:20)
- Around 12:00 Unit-6 Transferred puddle water in turbine building basement, confirmed that low level radioactive contaminated water was leaking from the temporary tank in which puddle water was being stored
- 12:32 Unit-5 Began operation of emergency diesel generator 5B, restoring it to standby condition
- 15:55 Units-1 ~3 Restarted supply of processed water for reactor injection from water treatment facility
- 20:06 Unit-2 Confirmed start of nitrogen sealing for reactor containment vessel in order to reduce risks of hydrogen combustion in the reactor containment vessel

June 29 (Wed)

- 10:59 Units-1 ~ 3 Temporarily halted recirculated water injection cooling for reactor (-13:33)
- 13:28 Unit-4 Entered 5th floor of reactor building, performed inspection prior to spent fuel pool alternative cooling work (-14:21)
- 14:45 Unit-3 Injected fresh water (approx. 30 t) from FPC system to spent fuel pool (-15:53)

June 30 (Thu)

- 08:56 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (1 pump)
- 09:00 Shut down water treatment facility fresh water processing unit due to concentration tank increase / connection work
- 10:02 Unit-5 Temporarily stopped residual heat removal system (RHR) pump to switch power sources of surrounding equipment (-11:48)
- 10:43 Unit-3 Conducted leak testing of primary alternative spent fuel pool cooling system
- 10:46 Temporarily halted water treatment facility operation for adsorption tower vessel exchange (-13:35)
- 11:30 Unit-4 Injected fresh water into spent fuel pool via temporary dousing equipment (-11:55)
- 13:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been sent from the basement of the turbine building, to the mega float (-19:00)
- 14:36 Automatic shutdown of water treatment facility due to low alarm activation of water processing tank water level
- 18:33 Unit-3 Began trial operation of alternative spent fuel pool cooling system
- 18:50 Restarted operation of water treatment facility

July 1 (Fri)

07:27 Units-1 ~ 3 Temporarily halted feedwater from processed water due to buffer tank installation / connection work (-July 2, 14:22, actual injection 18:00-)

10:00 Unit-6 Began transferring puddle water in basement of turbine building to temporary tank

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to the mega float (-July 3, 16:00)

July 2 (Sat)

10:30 Temporarily halted water treatment facility operation due to adsorption tower vessel exchange (-13:45)

July 3 (Sun)

10:00 Unit-5 Temporarily shut down temporarily installed residual heat removal seawater system (RHRS) pump due to outlet side piping exchange work for said pump (-13:36)

10:15 Unit-5 Temporarily shut down residual heat removal (RHR) system pump (-13:40)

10:20 Unit-5 Temporarily shut down temporary RHRS pump (B) (-13:22)

10:39 Temporarily halted water treatment facility operation due to adsorption tower vessel exchange (-12:50)

16:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank

20:17 Halted transfer of puddle water to water treatment facility buffer tank due to buffer tank being full; however, contaminated water processing and core injection continued to be carried out

July 4 (Mon)

08:50 Unit-1 Temporarily increased flow rate to 7.5m³/h to perform flushing due to reactor injection ratio dropping to 3.0m³/h (8:40- 8:50); adjusted flow rate to 3.8m³/h afterwards

09:13 Unit-4 Filled device storage pool (DSP) with water (-18:18)

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)

13:30 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to the mega float (-17:00)

17:18 Restarted transfer of processed water to buffer tank

July 5 (Tue)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to the mega float (-17:00)

10:30 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:30)

10:30 Temporarily halted water treatment facility operation due to adsorption tower vessel exchange (-13:20)

15:10 Unit-1 Injected fresh water (approx. 75 t) from FPC system to spent fuel pool (-17:30)

July 6 (Wed)

06:53 Halted transfer of processed water to buffer tank due to buffer tank water level reaching upper control value. However, processing of contaminated water and injection into core continued to be carried out.

08:00 Temporarily shut down fresh water processing unit (-July 7, 11:09)

08:45 Unit-6 Transferred puddle water in basement of turbine building to unit-6 waste processing building (-10:50)

10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-17:00)

10:20 Unit-4 Carried out preparations for spent fuel pool alternative cooling work (-10:33)

July 7 (Thu)

04:52 Began transfer of processed water to buffer tank due to buffer tank water level reaching lower control value

10:09 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to the mega float (-17:00)

10:30 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:30)

11:00 Temporarily halted water treatment facility operation due to adsorption tower vessel exchange (-July 8, 02:45)

15:00 Unit-2 Halted transfer of puddle water from turbine building trench due to water level in collective waste processing facility reaching transfer stopping levels

23:30 Temporarily shut down puddle water transfer pump due to drop in processed water temporary tank water level (-July 8, 02:45)

July 8 (Fri)

02:45 Restarted transfer of processed water to buffer tank

04:44 Temporarily shut down puddle water transfer pump due to drop in processed water temporary tank water level

08:20 Unit-4 Temporarily shut down unit-3 alternative spent fuel pool cooling system due to alternative spent fuel pool cooling system work (-14:24)

08:22 Unit-4 Filled device storage pool (DSP) with water (-13:52)

10:00 Unit-4 Performed piping robustness confirmation as part of alternative spent fuel pool cooling system work (-11:30)

10:00 Temporarily shut down water treatment facility operation due to adsorption tower vessel exchange (-12:04)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to the mega float (-17:00)

10:30 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:30)

10:44 Unit-2 Performed flushing for transfer line between turbine building trench and collective waste processing facility (-12:30)

13:51 Restarted sending of processed water to buffer tank due to buffer tank water level nearing lower control values

July 9 (Sat)

07:35 Halted transfer of processed water to buffer tank due to drop in processed water temporary tank water levels; however, contaminated water processing and core injection continued to be carried out

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-17:00)

10:30 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:30)

14:49 Unit-3 Halted transfer of puddle water in basement of turbine building to collective waste processing facility

15:22 Unit-3 Began flushing of transfer line which transferred puddle water from basement of turbine building to collective waste processing facility

15:59 Restarted transfer of processed water to buffer tank

July 10 (Sun)

04:53 Shut down water treatment facility due to leakage of chemical liquid from chemical injection line of coagulation settling equipment

12:11 Halted transfer of processed water to buffer tank due to drop in processed water temporary tank water levels; however, contaminated water processing and core injection continued to be carried out

15:15 Unit-3 Restarted transfer of puddle water in basement of turbine building to collective waste processing facility

17:06 Repaired coagulation settling equipment leakage part, then started up water treatment facility. Afterwards, achieved rated flow rate (17:40)

21:20 Restarted transfer of processed water to buffer tank

July 11 (Mon)

Operated diesel generators for dual-line preparation work for Yoru no Mori power lines

- D/G 5A started up (03:03), synchronised (03:19), disconnected (09:07), shut down (09:07) due to alarm activation
- D/G 5B started up (03:37), synchronised (03:44), disconnected (13:18), shut down (14:44)
- D/G 6A started up (04:17), synchronised (04:21), disconnected (13:40), shut down (15:42)
- D/G 6B started up (04:31), synchronised (04:36), disconnected (13:44), shut down (16:36)

05:01 Halted power reception from Yoru no Mori power lines due to dual-line preparation work for Yoru no Mori power lines (-13:44)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-17:00)

10:30 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:30)

July 12 (Tue)

08:51 Shut down water treatment facility due to leakage of chemical liquid from chemical injection line connection part of coagulation settling equipment

11:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-16:00)

11:22 Unit-4 Filled device storage pool (DSP) with water (-12:03)

16:28 Repaired coagulation settling equipment leakage part, then started up water treatment facility

July 13 (Wed)

06:30 Unit-5 Temporarily shut down RHR pump to exchange temporary RHR pump hose (-10:58)

08:40 Unit-6 Transferred puddle water in basement of reactor building to Unit-6 waste processing building (-10:50)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-17:00)

10:00 Unit-2 Began transferring puddle water in turbine building trench to collective waste processing facility

10:09 Unit-4 Filled device storage pool (DSP) with water (-12:45)

11:00 Temporarily shut down water treatment facility operation due to adsorption tower vessel exchange (-July 14, 14:58)

13:07 Halted flushing of water treatment facility due to confirmation of leakage from chemical injection line connection part of coagulation settling equipment

16:22 Adjusted buffer tank transfer rate from 23m³/h to 18m³/h

July 14 (Thu)

05:30 Unit-1 Changed reactor injection ratio to 3.5m³/h due to injection ratio decreasing to 3.2m³/h

July 15 (Fri)

05:14 Shut down water treatment facility due to investigation of cause of flow rate decrease (-14:21)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-17:00)

10:50 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility

10:56 Unit-2 Transferred puddle water in turbine building trenches to collective waste processing facility

13:05 Unit-4 Filled device storage pool (DSP) with water (-19:15)

14:25 Unit-5 Shut down RHR (C) pump

14:45 Unit-5 Started up RHR (D) pump

18:32 Transferred processed water from processed water temporary storage tank to buffer tank (-July 17, 03:20)

July 16 (Sat)

Operated diesel generators for dual-line preparation work for Yoru no Mori power lines

- D/G 5B started up (04:01), synchronised (04:12), disconnected (11:48), shut down (13:05)
- D/G 6B started up (04:21), synchronised (04:35), disconnected (12:05), shut down (13:51)

05:28 Halted power reception from Yoru no Mori power lines due to dual-line preparation work for Yoru no Mori power lines (-12:05)

10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-15:00)

10:50 Temporarily shut down water treatment facility operation due to adsorption tower vessel exchange

10:50 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (- July 21, 15:59)

10:56 Unit-2 Transferred puddle water in turbine building trench to collective waste processing facility (- July 21, 16:04)

11:22 Unit-4 Filled device storage pool (DSP) with water (-15:52)

July 17 (Sun)

Operated diesel generators for dual-line preparation work for Yoru no Mori power lines

- D/G 5B started up (03:08), synchronised (03:17), disconnected (14:14), shut down (15:26)
- D/G 6B started up (03:28), synchronised (03:40), disconnected (14:34), shut down (16:02)

04:24 Halted power reception from Yoru no Mori power lines due to dual-line preparation work for Yoru no Mori power lines (-13:20)

10:06 Unit-1 Alarm sounding (09:46) when injection ratio decreased to 3.0m³/h. Changed reactor injection ratio to 3.8m³/h

14:25 Units-1, 2 Adjusted reactor injection ratio to 4.0m³/h after switching from reactor injection pump 1 to reactor injection pump 2

July 18 (Mon)

08:30 Unit-3 Installed temporary roof over turbine building rooftop opening (-14:40)

09:00 Unit-6 Transferred puddle water in basement of reactor building to unit-6 waste processing building (-10:30)

11:00 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-14:59)

July 19 (Tue)

08:30 Unit-3 Installed temporary roof over turbine building rooftop opening (-15:00)

10:10 Units-1, 2 Adjusted reactor injection ratio to 3.8m³/h

11:00 Exchanged water treatment facility vessels (temporarily shut down water treatment facility) (-15:03)

July 20 (Wed)

11:15 Unit-4 Filled device storage pool (DSP) with water (-15:39)

July 21 (Thu)

08:38 Unit-3 Temporarily shut down alternative spent fuel pool cooling system due to dual-line restoration work for Yoru no Mori power lines (-14:52)

08:38 Temporarily shut down water treatment facility operation due to adsorption tower vessel exchange (- July 22, 00:23)

08:40 Temporarily halted cooling of spent fuel pool due to dual-line restoration work for Yoru no Mori power lines (-14:41)

11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (- July 22, 18:00)

July 22 (Fri)

07:10 Temporarily halted cooling of spent fuel pool due to Okuma power line 2 circuit breaker shutdown (-10:40)

07:10 Unit-3 Temporarily shut down alternative spent fuel pool cooling system due to Okuma power line 2 circuit breaker shutdown (-11:50)

07:10 Water treatment facility temporarily shut down due to Okuma power line 2 circuit breaker shutdown

08:30 Unit-3 Installed temporary roof over turbine building rooftop opening (-15:30)

08:43 Unit-2 Adjusted reactor injection ratio to 3.8m³/h due to it dropping to 3.4m³/h

16:53 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility (-July 29, 09:48)

16:56 Unit-2 Transferred puddle water in turbine building trench to collective waste processing facility (-July 29, 09:43)

17:00 Replenished buffer tank with water from filtered water tank (-July 23, 11:04)

July 23 (Sat)

03:24 Temporarily shut down alternative spent fuel pool cooling system due to dual-line restoration work for Yoru no Mori power lines (-11:45)

03:46 Temporarily halted cooling of spent fuel pool due to dual-line restoration work for Yoru no Mori power lines (-09:41)

08:45 Temporarily shut down water treatment facility due to dual-line restoration work for Yoru no Mori power lines (-15:26)

09:35 Unit-2 Adjusted reactor injection ratio to 3.8m³/h after dropping to 3.2m³/h

11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-18:00)

14:15 Transferred puddle water from miscellaneous solid waste reduction processing building to process main building (-19:00)

18:10 Transferred processed water from processed water temporary tank to buffer tank (-19:27)

July 24 (Sun)

10:37 Unit-4 Filled device storage pool (DSP) with water (-15:20)

- 11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
- 11:10 Unit-1 Adjusted reactor injection ratio to 3.8m³/h after dropping to 3.3m³/h
- 11:27 Transferred processed water from processed water temporary tank to buffer tank (-15:11)
- 12:30 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-16:35)
- 17:44 Replenished buffer tank with filtered water from filtered water tank due to buffer tank water level nearing lower control values
- 20:00 Unit-1 Switched to supplies for nitrogen sealing of the Primary Containment Vessel (PCV) that was supplying from the compressor to Units-2, 3

July 25 (Mon)

- 10:29 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-10:48)
- 12:29 Unit-2 Injected approx. 1m³ of hydrazine from alternative spent fuel pool cooling system to spent fuel pool (-13:27)
- 21:35 Temporarily shut down the pump in system 1 of cesium adsorption unit (-21:56)

July 26 (Tue)

- 09:59 Transferred puddle water from miscellaneous solid waste reduction processing equipment to process main building (-16:01)
- 11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-July 27, 16:00)
- 11:00 Unit-6 Transferred puddle water in basement of reactor building to unit-6 waste processing building (-12:00)
- 11:15 Unit-2 Injected approx. 1.2m³ of hydrazine from alternative spent fuel pool cooling system to spent fuel pool (-12:52)
- 11:37 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-14:06)

July 27 (Wed)

- 08:45 Unit-6 Transferred puddle water in basement of reactor building to temporary tank (-11:20, 13:00 - 13:30)
- 10:00 Unit-6 Began transferring puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float. Later halted transfer due to transfer pump leakage (10:45). Exchanged transfer pump (12:30 – 14:00). Approx. 20 liters leaked, but this leaked water was not released into the ground or ocean.
- 11:06 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-11:28)
- 18:10 Unit-1 Adjusted core injection ratio to 3.8m³/h per one pump
- 18:10 Unit-2 Adjusted core injection ratio to 3.5m³/h per one pump
- 18:10 Unit-3 Adjusted core injection ratio to 9.0m³/h per one pump

July 28 (Thu)

- 10:00 Unit-6 Began transferring puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float
- 11:00 Unit-4 Filled device storage pool (DSP) with water (-16:00)
- 11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
- 11:11 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-12:15)
- 17:30 Unit-2 Adjusted reactor injection ratio to $3.6\text{m}^3/\text{h}$ since it had decreased to $3.2\text{m}^3/\text{h}$

July 29 (Fri)

- 05:08 Temporarily shut down the pump in a system of cesium adsorption unit
- 10:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-17:00)
- 10:03 Transferred puddle water from miscellaneous solid waste reduction processing building to process main building (-16:09)
- 11:00 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-11:34)
- 11:55 Unit-3 Injected hydrazine from alternative spent fuel pool cooling system to spent fuel pool (-13:29)

July 30 (Sat)

- 10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float (-17:00)
- 11:00 Unit-6 Transferred puddle water in basement of turbine building to temporary tank (-16:00)
- 11:04 Transferred puddle water in basement of common spent fuel pool building to fresh water processing unit upstream side receiving tank
- 11:12 Unit-3 Began injecting hydrazine from alternative spent fuel pool cooling system to spent fuel pool
- 11:30 Exchanged water treatment facility vessels (without shutting down water treatment facility) (-13:35)
- 11:57 Unit-1 Adjusted reactor injection ratio to $3.6\text{m}^3/\text{h}$ since it had decreased to $3.4\text{m}^3/\text{h}$
- 11:57 Unit-2 Adjusted reactor injection ratio to $3.6\text{m}^3/\text{h}$ since it had decreased to $3.3\text{m}^3/\text{h}$
- 13:16 Unit-4 Filled device storage pool (DSP) with water (-14:47)
- 16:10 Unit-2 Transferred puddle water in turbine building trench to collective waste processing facility
- 16:13 Unit-3 Transferred puddle water in basement of turbine building to collective waste processing facility

July 31 (Sun)

- 05:01 Unit-1 Adjusted reactor injection ratio to $3.7\text{m}^3/\text{h}$ since it had decreased to $3.5\text{m}^3/\text{h}$

- 05:01 Unit-2 Adjusted reactor injection ratio to 3.7m³/h since it had decreased to 3.2m³/h
- 10:00 Unit-6 Transferred puddle water collected in the temporary tank, which had been in the basement of the turbine building, to mega float
- 11:00 Unit-6 Began transferring puddle water in basement of turbine building to temporary tank
- 13:58 Transferred puddle water from miscellaneous solid waste reduction processing building to process main building

(2) Tokyo Electric Power Company's 2F

March 11 (Fri)

- 14:48 The earthquake automatically shut down the unit-1~4.
- 17:35 Unit-1 Confirmed conditions should be reported under Article 10 of the Nuclear Emergency Preparedness Act.
(Due to potential leakage of reactor coolant)
- 18:33 Units-1, 2, 4 Confirmed conditions should be reported under Article 10 of the Nuclear Emergency Preparedness Act.
(Due to the Loss of the residual heat removal function)

March 12 (Sat)

- 03:00 Units-1~4 Injected water to the reactor with condensate makeup water system
- 05:22 Unit-1 Confirmed conditions should be reported under Article 15 of the Nuclear Emergency Preparedness Act.
(Due to the loss of the reactor pressure control function)
- 05:32 Unit-2 Confirmed conditions should be reported under Article 15 of the Nuclear Emergency Preparedness Act.
(Due to the loss of the reactor pressure control function)
- 06:07 Unit-4 Confirmed conditions should be reported under Article 15 of the Nuclear Emergency Preparedness Act.
(Due to the loss of the reactor pressure control function)
- 07:45 Declaration of nuclear emergency was announced:
According to Article 15 Paragraph 3 of the Nuclear Emergency Preparedness Act, the prime minister instructed the evacuation of local residents within 3km radius of 2F. Residents within 10km radius were instructed to stay indoors.
- 12:15 Unit-3 reaches the state of cold shutdown.
- 17:39 The prime minister instructed the evacuation of local residents within 10km radius of 2F.

March 14 (Mon)

- 01:24 Unit-1 Restoration of reactor cooling function
- 07:13 Unit-2 Restoration of reactor cooling function
- 10:15 Unit-1 recovered from conditions that constitute an event requiring reporting under Article 15 of the Nuclear Emergency Preparedness Act.

- 13:40 Unit-1 reached the state of cold shutdown.
- 14:20 Unit-2 reached the state of cold shutdown.
- 15:42 Unit-4 Restoration of reactor cooling function
- 15:52 Unit-2 recovered from conditions that constitute an event requiring reporting under Article 15 of the Nuclear Emergency Preparedness Act.
- 21:58 Confirmed conditions of 2F should be reported under Article 10 of the Nuclear Emergency Preparedness Act. (MP1).
(Due to an increase of radiation dose at the site's boundary, which is suspected to be the effect of the situation at 1F)

March 15 (Tue)

- 00:00 Confirmed conditions of 2F should be reported under Article 10 of the Nuclear Emergency Preparedness Act. (MP3).
(Due to an increase of radiation dose at the site boundary, which is suspected to be the effect of the situation at 1F)
- 07:15 Unit-4 reaches the state of cold shutdown.
Unit-4 recovered from conditions that constitute an event requiring reporting under Article 15 of the Nuclear Emergency Preparedness Act.

March 17 (Thu)

- 00:00 Unit-1, 2, 3 and 4 were in the state of cold shutdown.

March 18 (Fri)

- 17:50 NISA announced the results of temporarily rates of INES (International Nuclear and Radiological Event Scale)
•Unit-1, 2, 4: Level 3 (Serious Incident)

March 21 (Mon)

- 00:00 Unit-1, 2, 3 ,4 were in the state of cold shutdown.
Unit 1 Reactor water level: 10,696mm
Unit 2 Reactor water level: 10,246mm
Unit 3 Reactor water level: 7,596mm
Unit 4 Reactor water level: 8,596mm

March 22 (Tue)

- 00:00 Unit-1, 2, 3, 4 were in the state of cold shutdown
Unit-1 reactor water level: 8,146mm
Unit-2 reactor water level: 10,246mm
Unit-3 reactor water level: 7,396mm
Unit-4 reactor water level: 8,096mm

March 24 (Thu)

- 00:00 Unit-1, 2, 3, 4 were in the state of cold shutdown
Unit-1 reactor water level: 9,196mm
Unit-2 reactor water level: 10,296mm
Unit-3 reactor water level: 7,596mm
Unit-4 reactor water level: 8,796mm

March 30 (Wed)

- 17:56 Smoke generation from around the 1st floor of the Turbine Building of unit-1 was discovered. The incident was reported to the fire department.

(It was confirmed that there was no longer any smoke at 18:13.)

19:15 The fire department made a judgmental decision that this incident of unit-1 was caused fault of the equipment, they found no signs of fire.

April 7 (Thu)

23:55 Units-1~4 No abnormalities in plant or waste processing building due to earthquake at around 23:32

April 11 (Mon)

17:45 Units-1~4 No abnormalities in plant or waste processing building due to earthquake at around 17:16

April 12 (Tue)

14:30 Units-1~4 No abnormalities in plant or waste processing building due to earthquake at around 14:07

April 16 (Sat)

11:38 Units-1~4 No abnormalities in plant or waste processing building due to earthquake at around 11:19

April 22 (Fri)

00:00 Changed evacuation area from 10km radius to 8km radius

(3) Tohoku Electric Power Company's Onagawa NPS

March 11 (Fri)

14:46 The earthquake automatically shut down Onagawa NPS unit-1~3.

Unit-1: The loss of off-site power led to the startup of emergency diesel generators (failure of start-up transformer)

Unit-2 and 3: Receiving off-site power

(Unit-2 was just after reactor start-up, being cold shut down)

15:30 Smoke was seen from the first basement floor of the turbine building.

17:15 CO2 fire extinguishers commenced.

22:55 Fire extinguishment was confirmed.

March 12 (Sat)

00:58 Unit-2 reaches the state of cold shutdown.(under 100)

01:17 Unit-3 reaches the state of cold shutdown.(under 100)

As of 22:00 Unit-1 restored the start-up transformer and off-site power.

March 13 (Sun)

12:50 Reported conditions of Onagawa NPS under Article 10 of the Nuclear Emergency Preparedness Act.

(Although the radiation is not from Onagawa NPS, radiation level of the site's boundary reached the criteria (5 μ Sv/h). Temporally, it reached up to 21 μ Sv/h.)

March 29 (Tue)

The collapse of the outdoor heavy oil tank for auxiliary boiler of unit-1 by Tsunami was reported under the Article 3 of the Ministerial Ordinance for the Reports related to Electricity as it constitutes the breakage of a main electric facility.

The motors of pump for the component cooling water system and high pressure core spray system cooling water system of unit-2 were found to have suffered water damage. They were transported to a factory for inspection and subsequently confirmed that they could not longer be used. This was reported under the Article 62-3 of the Nuclear Regulation Act.

April 1 (Fri)

10:40 Unit-1 Confirmed emergency diesel generator (A) could not connect to station power systems during regular testing (deviation from LCO, switched reactor cooling system to B system, LCO restored)

April 7 (Thu)

23:32 Earthquake occurred (seismic acceleration measured at Onagawa power station: 476.3 Gal) Oshika Line line 1, Matsushima Line line 1, and Tsukahama Line line 1 shut down. Receive power from Matsushima Line 1 line 1.

April 8 (Fri)

08:08 Restoration of Oshika Line 2
08:31 Restoration of Oshika Line 1
09:22 Shut down Matsushima Line 1 for inspection
14:01 Restoration of Tsukahama Line
18:45 Restoration of Matsushima Line 1

April 10 (Sun)

15:38 Restoration of Matsushima Line 2

(4) Tohoku Electric Power Company's Higashidori NPS

March 11 (Fri)

14:46 Loss of off-site power led to the startup of emergency diesel generators while being in outage shutdown.
23:50 External power was restored.

(5) Japan Atomic Power Company's Tokai No.2

March 11 (Fri)

14:48 The earthquake automatically shut down (large turbine vibrations)
15:10 Reactor has reached under critical condition

March 13 (Sun)

19:37 Back up power supply is restored.
Work to switch the station's power supply to back up power was completed.

March 15 (Tue)

00:40 Reached the state of cold shutdown.

March 18 (Fri)

15:00 Switched from back up power line to main power line

March 22 (Tue)

22:10 3 emergency diesel generators restored to standby (since one of the seawater pumps had shut down due to the tsunami, one of the emergency diesel generators had been shut down.)

July 15 (Fri)

15:09 Unit-1 Emergency diesel generator (B) restored to standby condition due to completion of repairs

July 16 (Sat)

11:11 Unit-1 Restored reactor coolant purification system

July 17 (Sun)

09:36 Unit-1 Temporarily shut down RHR (B) pump due to recirculation system switching work (-14:13)

11:04 Unit-1 Started up FPC (B) pump

11:40 Unit-2 Restored reactor coolant purification system

July 18 (Mon)

10:39 Unit-2 Temporarily shut down RHR (B) pump due to recirculation system switching work (-12:19)

11:33 Unit-2 Started up FPC system pump (A)

End