Major Events after the Earthquake

11:30 Lighting in the main Control Room was recovered.
15:37 Started to inject fresh water.
48.1°C
0.125MPa*
14:10

Fresh water is being injected to the Spent Fuel Pool and the Reactor Core to vent.

08:32
17:56 External power supply was recovered.

22:30

Started the operation for the injection of nitrogen to PCV.
20:20

Started to inject seawater and borated water to the Reactor Core.

10:23
23:19 Restarted operation for injecting nitrogen to PCV.

Water Temperature B
11:35
47.9°C
01:20 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
16:00

Water Temperature A
15:42 Report based on the Article 10 (Total loss of A/C power)
01:31 Confirmed starting the injection of nitrogen to PCV.
10:17

Sound of explosion around 17:16 Loss of external power supply due to an earthquake occurred (at 14:46 Under operation, Automatic shutdown by the earthquake)

10:57

Started

23:34 Confirmed starting injection of nitrogen to PCV.
11:50

09:30 Completed transferring the water from the Condenser to CST. Switched to the water injection to the Reactor Core using the temporary motor-driven pump.

March 11 14:46 Under operation, Automatic shutdown by the earthquake
March 11 15:42 Report based on the Article 10 (Total loss of A/C power)
March 11 16:36 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
March 12 01:20 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
March 12 10:17 Started to vent.
March 12 15:36 Sound of explosion
March 12 20:20 Started to inject seawater and borated water to the Reactor Core.
March 23 02:33 The amount of injected water into the Reactor Core was increased utilizing the Feedwater Line in addition to the Fire Extinguish Line.
09:00 Switched to the Feedwater Line only. (18m³/h →11m³/h)
March 24 11:30 Lighting in the main Control Room was recovered.
March 25 15:37 Started to inject fresh water.
March 29 08:32 Switched to the water injection to the Reactor Core using the temporary motor-driven pump.
March 31 12:00 ～2nd 15:26 Started to transfer the accumulated water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
April 3 12:02 The power supply to the temporary motor-driven pump was switched from the temporary power supply to the external power supply.
April 3 13:55 Started to transfer the water from the Condenser to CST.
April 6 22:30 Started the operation for the injection of nitrogen to PCV.
April 7 01:31 Confirmed starting the injection of nitrogen to PCV.
April 9 04:10 Started using highly pure nitrogen generator in the injection of nitrogen to PCV.
April 10 09:30 Completed transferring the water from the Condenser to CST.
April 11 around 17:16 Loss of external power supply due to an earthquake occurred (at Hamadori in Fukushima Prefecture) and water injection to the Reactor Core and nitrogen injection to PCV were suspended.
April 11 17:56 External power supply was recovered.
April 11 18:04 Resumed injecting water to the Reactor Core.
April 11 23:19 Restarted operation for injecting nitrogen to PCV.
April 11 23:34 Confirmed starting injection of nitrogen to PCV.
April 17 16:00 ～17:30 Confirmed the situation in the reactor building using an unmanned robot.
April 18 11:50 ～12:12 Stopped the water injection into the Reactor Core to replace the current hose with a new one.
April 19 10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.
April 25 10:57 ～18:25 For reinforcement work of the power supply, the power supply to the pump injecting water into the Reactor Core was temporarily switched from the external power supply to the temporary diesel generator.
April 25 14:10 ～19:10 Suspected nitrogen injection due to reinforcement work of the power supply.
April 25 14:44 ～17:38 Implemented reinforcement work of the power supply (connection of the power supplies between Units 1-2 and Units 5-6).
April 26 11:35 ～13:24(approx.) Confirmed the situation in the reactor building using an unmanned robot.

Spraying freshwater by temporary motor driven pump through existing cooling system

Spent Fuel Pool Cooling System

Spent Fuel Pool Water Temperature — °C
Condition: Indicator failure

Reactor Pressure A 0.135MPa*
Reactor Pressure B - MPa *
Condition: Almost no change
*Readings of temporary gauges were converted to absolute pressure, and represented in A from 11:00 June 4.

Reactor Water Level A Off scale
Reactor Water Level B -1,650mm (under monitoring of the change of the situation)
Condition: Uncovering of the core from the top of the active fuel to the levels described above

Reactor Water Temperature — °C
Condition: No data available

Reactor Pressure Vessel (RPV)
Temperature:
Feedwater Nozzle Temperature :113.2°C
Temperature at the bottom head of RPV :100.7°C

PCV*3 Pressure 0.1416MPa*
Condition: Almost no change

S/P*4 Water Temperature A 48.1°C
S/P*4 Water Temperature B 47.9°C
Condition: Almost no change
S/P*4 Pressure 0.125MPa*
Condition: Almost no change

Current Conditions: Fresh water is being injected to the Spent Fuel Pool and the Reactor Core

(As of 12:00 July 18, 2011)

*1 Residual Heat Removal System
*2 Emergency Diesel Generator
*3 Primary Containment Vessel
*4 Suppression Pool

*Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook*
April 27 10:02 Started the operation of gradually changing the amount of water for injection to the Reactor Pressure Vessel, (RPV) from about 6m³/h to the maximum of about 14m³/h. After carrying out the injection at 10m³/h, the injection rate was changed back to 6m³/h. (April 29 10:14)

April 29 11:36～14:05 Confirmed the situation in the reactor building using an unmanned robot.

May 2 12:58 ～ 15:03 The pump for the injection of water into the Reactor Core was temporarily replaced with the Fire Extinguishing Pump in order to install an alarm device in the pump.

May 5 16:36～May 8 20:02 Operated all ambient filtration systems (a total of 6 units) in order to improve the working environment in the reactor building.

May 6 10:01 Changed the rate of water injection into the Reactor Core from 6m³/h to 8m³/h.

May 8 20:08 Ventilation by cutting of the exhaust air duct

May 9 04:17 Opening the double-entry doors of the Reactor Building

May 9 05:10 Disassembly of positive pressure house

May10 10:55(approx.) Calibrated the reactor water level gauge

May 11 08:47～15:55 Due to the restoration of the Okuma No.2 transmission line, the power supply for the water injection pump into the reactor was temporarily switched to the temporary diesel generator.

May 11 08:50～15:58 Due to the restoration of the Okuma No.2 transmission line, the nitrogen injection was temporarily suspended.

May 11 08:50～11:14 Confirmed the reactor water level of RPV, calibrated reactor pressure gauge of primary containment vessel.

May 13 16:01～17:39 Observed the situation in the Reactor Building using a remote-control robot

May 14 15:07～15:18 Water spray over the Spent Fuel Pool by Concrete Pump Truck (stopped due to strong winds)

May 15 13:28 Changed the rate of water injection into the Reactor Core from 8m³/h to 10m³/h.

May 17 11:50 Changed the rate of water injection into the Reactor Core from 10m³/h to 6 m³/h.

May 20 09:30～12:15 Entered in the reactor building, confirmed reactor water level and radioactivity.

May 25 09:14～09:18 Nitrogen injection to PCV were suspended for changing power supply.

May 25 15:16～15:18 Nitrogen injection to PCV were suspended for changing power supply.

May 25 15:45 Confirmed that the compressor for nitrogen supplying was stopped. 19:44 Restart the nitrogen injection after changing to the reserve compressor.

May 27 10:30～around 12:00 and around 15:00 Entered in the reactor building, Installed the level gauge of reactor building accumulated water, Sampled basement accumulated water, and Installed hoses for SFP.

May 28 16:47～17:00 Leak test in order to inject fresh water to SFP via FPC

May 31 20:30 Changed the rate of water injection into the Reactor Core from 6m³/h to 5m³/h.

June 3 10:38～12:21 Installed temporary pressure gauges for the reactor.

June 3 around 15:00～ around 17:00 Confirmed the situation in the reactor building using an unmanned robot.

June 4 09:57～13:56 Suspended the injection of coolant water due to the work for changing the route of water supply line to the Reactor Core. (10:02～13:43 Injected water into the Reactor Core by the fire engine pump.)

June 8 14:57～17:54 Suspended the nitrogen injection due to the stop of the power center 2C.

June 13 14:58～17:43 Transfer the accumulated water from the Condenser to the basement of turbine building.

June 14 14:09 Replaced the pump for the injection of water into the Reactor Core with the Fire Extinguishing Pump.

June 14 15:35～15:50 Suspended water injection to replace the hose of water injection into the reactor.

June 15 10:06 The water injection rate into the reactor was changed from about 5m³/h to about 4.5m³/h.

June 15 10:33～June 16 09:52 Transferred the accumulated water from the Condenser to the CST.
June 19 10:35～15:47 Due to preparation for the suspension works of the Okuma No.2 transmission line, the power supply for the water injection pump into the Reactor Core was temporarily switched to the diesel generator.

June 19 11:48～16:05 Due to preparation for the suspension works of the Okuma No.2 transmission line, the nitrogen injection was temporarily suspended.

June 21 10:02 The water injection rate into the reactor was changed from about 4.5m³/h to about 4.0m³/h.

June 21 11:55～18:03 The nitrogen injection was temporarily suspended due to the installation work of a temporary transformer.

June 22 10:02 The water injection rate into the reactor was changed from about 4.0m³/h to about 3.5m³/h.

June 23 18:27 Water injection into the Reactor Core of Units 1 and 2 was begun, using the water injection pump into the Reactor Core for Unit 1.

June 27 08:08～14:38 The nitrogen injection was temporarily suspended due to preparation for the restoration works of the Okuma No.2 transmission line to the diesel generator.

June 27 08:51～15:07 Due to preparation for the restoration works of the Okuma No.2 transmission line, the nitrogen injection was temporarily suspended.

June 27 16:20 Started use of water treated in the water treatment facilities for injection into the reactor, in addition to water injection from the filtered water tank. Suspended supply of treated water because of a leakage from the pipe (17:55). Started the treated water transfer pump (June 28 14:36). Resumed supply of treated water (June 28 15:55).

June 29 10:59～13:33 Regarding the Circulating Injection Cooling of the Reactor Cores, supply of treated water was temporarily suspended due to leakage from a pipe for injection cooling.

July 1 07:27～July 2 14:22 Temporarily suspended supply of treated water into the reactor due to works to install and connect a buffer tank. (July 2 14:22 ～18:00 Trial injected into the Reactor Core from a Buffer Tank due to leakage check. 18:00 ～Full-fledged operated)

July 4 08:50 The water injection rate into the reactor was adjusted to 3.8 m³/h, due to decrease to 3.0 m³/h.

July 14 05:30 The water injection rate into the reactor was adjusted to 3.5 m³/h, due to decrease to 3.2 m³/h.

July 15 08:55 The water injection rate into the reactor was adjusted to 3.8 m³/h, due to decrease to 3.2 m³/h.

July 17 10:06 The water injection rate into the reactor was adjusted to 3.8 m³/h, due to decrease to 3.0 m³/h.

July 17 14:25 The water injection rate into the reactor was adjusted to 4.0 m³/h, after switching from the number 1 pump for injecting water into the reactor to the number 2 pump.

<Water spray over the Spent Fuel Pool by Concrete Pump Truck (Fresh water)>
March 31 13:03～16:04, May 20 15:06～16:15, May 22 15:33～17:09

<Fresh water injection to SFP via FPC (using the temporary motor-driven pump)>
May 29 11:10～15:35, June 5 10:16～10:48, July 5 15:10～17:30
Current Conditions: Fresh water is being injected to the Spent Fuel Pool and the Reactor Core

Spent Fuel Pool Water Temperature 37.0℃
April 25 10:57～18:25 For reinforcement work of the power supply, the power supply to the pump injecting water into the Reactor Core was temporarily switched from the external power supply to the temporary diesel generator.
April 25 14:44～17:38 Implemented reinforcement work of the power supply (connection of the power supplies between Units 1-2 and Units 5-6).
April 29 09:16 Suspended the transfer of accumulated water from the turbine building Trench of Unit 2 (accumulated water with high-level radioactivity) to the Radioactive Waste Treatment Facilities in order to carry out inspections, etc. of the transfer facilities. The transfer was resumed. (From 14:05 April 30th)
May 1 13:35～Started blocking the vertical shafts of Trench pit.
May 2 12:58～15:03 The pump for the injection of water into the Reactor Core was temporarily replaced with the Fire Extinguishing Pump in order to install an alarm device in the pump.
May 7 09:22 Suspended the transfer of accumulated water from the turbine building Trench of Unit 2 (accumulated water with high-level radioactivity) to the Radioactive Waste Treatment Facilities in order to carry out piping work of Reactor Feedwater System for Unit 3. The transfer was resumed. (From 16:02 May 7th)
May 10 09:01～May 12 15:20 Suspended the transfer of accumulated water from the turbine building Trench of Unit 2 (accumulated water with high-level radioactivity) to the Radioactive Waste Treatment Facilities in order to lay the water transfer pipes from the turbine building of Unit 3 to the Radioactive Waste Treatment Facilities.
May 11 08:47～15:55 Due to the restoration of the Okuma No.2 transmission line, the power supply for the water injection pump into the reactor was temporarily switched to the temporary diesel generator. (After the restoration, the power supply is partially received from this line.)
May 18 09:24～09:38 Conducted preliminary survey in the Reactor Building.
May 25 09:05～15:30 Suspended the transfer of accumulated water from the turbine building Trench to the Radioactive Waste Treatment Facilities in order to change power supply.
May 26 14:45～May 27 14:30 Transferred the water from the Condenser to the basement of the turbine building in order to carry out piping work of Reactor Feedwater System.
May 26 16:01 Suspended the transfer of accumulated water from the turbine building Trench to the Radioactive Waste Treatment Facilities. (Because the water level of the concerned Facilities was close to the first basement level.)
May 29 11:33 Started to inject water to the Reactor Core via Feedwater line in addition to Fire Extinguish line.
May 30 11:15 Conducted a leakage test on the secondary system of the alternative cooling system for the Spent Fuel Pool. A trial run of the secondary system was started at 15:02.
May 30 18:05 Stopped injecting water to the Reactor Core via Fire Extinguish line.
May 31 11:40 Conducted a leakage test on the primary system of the alternative cooling system for the Spent Fuel Pool.
May 31 17:21 Started full-fledged operation of the alternative cooling system for the Spent Fuel Pool.
June 3 13:49～14:09 Suspended the injection of coolant water due to the work for changing the route of water supply line to the Reactor Core.
June 3 18:39～June 4 12:28 Transferred the accumulated water from the trench of the turbine building to the condenser.
June 4 18:39～June 16 8:40 Transferred the accumulated water from the turbine building trench to the Radioactive Waste Treatment Facilities.
June 8 15:40～18:03 Suspended the transfer of accumulated water from the turbine building trench to the Radioactive Waste Treatment Facilities due to the stop of the power center 2C.
June 11 11:45～12:19 Conducted a test run of the ambient air filtration system of the reactor building.
June 11 12:42～Started full-scale operation of the ambient air filtration system of the reactor building.
June 14 12:14～12:37 Suspended water injection to replace the hose of water injection into the reactor.
June 17 14:20～14:59 Transferred accumulated water from the turbine building trench to the condenser of Unit 1 (suspended due to a malfunction of the pump).
June 19 10:49～15:35 Due to preparation for the suspension works of the Okuma No.2 transmission line, the power supply for the water injection pump into the Reactor Core was temporarily switched to the diesel generator.
June 19 11:03～16:00 Due to preparation for the suspension works of the Okuma No.2 transmission line, the alternative cooling system for the Spent Fuel Pool was temporarily suspended.
June 19 12:12～16:02 Due to preparation for the suspension works of the Okuma No.2 transmission line, the local exhauster was temporarily suspended.
June 19 20:51～The double door of the reactor building was slightly opened. June 20th The double door was fully opened from 05:00.
June 20 13:37～Started to transfer accumulated water from the turbine building trench to the condenser of Unit 1.
June 20  14:30  Opened the truck bay door of the reactor building.
June 21  10:04  The water injection rate into the reactor was changed from about 5.0 m³/h to about 4.5 m³/h.
June 21  13:15～13:25  Preliminary survey was conducted inside of the reactor building.
June 22  09:56  Started to transfer accumulated water from the turbine building trench to the Radioactive Waste Treatment Facilities.
June 22  10:04  The water injection rate into the reactor was changed from about 4.5 m³/h to about 4.0 m³/h.
June 23  10:36～12:36  Installation works of temporary pressure gauges for the reactor was conducted.
June 23  18:27  Water injection into the Reactor Core of Units 1 and 2 was begun, using the water injection pump into the Reactor Core for Unit 1.
June 24 around 6:58  An unmanned helicopter that was collecting dust coming out of the opening of the reactor building made an emergency landing on the rooftop of the building.
June 27  08:08～14:38  Due to preparation for the restoration works of the Okuma No.2 transmission line, the power supply for the water injection pump into the Reactor Core was temporarily switched to the diesel generator.
June 27  08:23～16:53  Due to preparation for the restoration works of the Okuma No.2 transmission line, the alternative cooling system for the Spent Fuel Pool was temporarily suspended.
June 27  16:20～17:45  Started use of water treated in the water treatment facilities for injection into the reactor, in addition to water injection from the filtered water tank. Suspended supply of treated water because of a leakage from the pipe (17:55). Started the treated water transfer pump (June 28 14:36). Resumed supply of treated water (June 28 15:55).
June 28  20:08  Started nitrogen injection into the PCV.
June 29  10:59～13:33  Regarding the Circulating Injection Cooling of the Reactor Cores, supply of treated water was temporarily suspended due to leakage from a pipe for injection cooling.
July 1  07:27～July 2 14:22  Temporarily suspended supply of treated water into the reactor due to works to install and connect a buffer tank. (July 2 14:22～18:00 Trial injected into the Reactor Core from a Buffer Tank due to leakage check. 18:00～Full-fledged operated)
July 8  10:34～13:49  Sampling of airborne radioactive materials was conducted by a robot on the second and the third floors of the reactor building.
July 8  10:44～12:30  Flashing was carried out for the transfer line from the trench of the turbine building to the Radioactive Waste Treatment Facilities.
July 13 10:09  Restarted to transfer accumulated water from the turbine building trench to the Radioactive Waste Treatment Facilities.
July 15  10:56～11:47  Transferred accumulated water from the turbine building trench to the Radioactive Waste Treatment Facilities.
July 17 14:25  The water injection rate into the reactor was adjusted to 4.0 m³/h, after switching from the number 1 pump for injecting water into the reactor to the number 2 pump.

<Sea water injection to SFP via FPC (using the fire engine pump)>
March 20 around 15:05～around 17:20, March 22nd 16:07～17:01, March 25 10:30～12:19

<Fresh water injection to SFP via FPC (using the temporary motor-driven pump)>
March 29 16:30～18:25, March 30 09:25～23:50 *Including interruption by pump malfunction and damage to the hose, April 1 14:56～17:05, April 4 11:05～13:37, April 7 13:29～14:34, April 10 10:37～12:38, April 13 13:15～14:55, April 16 10:13～11:54, April 19 16:08～17:28, April 22 15:55～17:40, April 25 10:12～11:18, April 28 10:15～11:28, May 2 10:05～11:40, May 6 09:36～11:16, May 10 13:09～14:45 (13:19～14:35 Hydrazine was also injected), May 14 13:00～14:37 (13:08～14:02 Hydrazine was also injected), May 18 13:10～14:40 (13:15～14:30 Hydrazine was also injected), May 22 13:02～14:40 (13:04～14:03 Hydrazine was also injected), May 26 10:06～11:36 (10:10～11:10 Hydrazine was also injected), May 30 12:06～13:52
**Major Events after the Earthquake 1/3**

- March 11 14:46 Under operation, Automatic shutdown by the earthquake
- March 11 15:42 Report based on the Article 10 (Total loss of A/C power)
- March 13 05:10 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
- March 13 08:41 Started to vent.
- March 13 13:12 Started to inject seawater and borated water to the Reactor Core.
- March 14 05:20 Started to vent.
- March 14 07:44 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
- March 14 11:01 Sound of explosion
- March 16 around 08:30 White smoke generated.
- March 17 09:48 ~ 10:01 Water spray from the ground by High pressure water-cannon trucks of Police
- March 17 19:35 ~ 20:09 Water spray from the ground by fire engines of Self-Defense Force
- March 18 before 14:00 ~ 14:38 Water spray from the ground by 6 fire engines of Self-Defense Force
- March 18 ~ 14:45 Water spray from the ground by a fire engine of the US Military
- March 19 00:30 ~ 01:10 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- March 19 14:10 ~ 20th 03:40 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- March 20 11:00 Pressure of PCV rose(320KPa). Afterward fell.
- March 20 21:36 ~ 21st 03:58 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- March 21 around 15:55 Grayish smoke generated and was confirmed to be died down at 17:55.
- March 22 15:10 ~ 16:00 Water spray by Hyper Rescue Unit of Tokyo Fire Department and Osaka City Fire Bureau.
- March 22 22:46 Lighting in the Central Control Room was recovered.
- March 23 11:03 ~ 13:20 Injection of about 35 ton of sea water to the Spent Fuel Pool (SFP) via the Fuel Pool Cooling Line (FPC)
- March 23 around 16:20 Black smoke generated and was confirmed to be died down at around 23:30 and 24:04:50.
- March 24 05:35 ~ 16:05 Injection of around 120 ton of sea water to SPFP via FPC
- March 25 13:28 ~ 16:00 Water spray by Kawasaki City Fire Bureau supported by Tokyo Fire Department
- March 25 18:02 Started fresh water injection to the core.
- March 27 12:34 ~ 14:36 Water spray by Concrete Pump Truck
- March 28 17:40 ~ 31st around 8:40 Transferring the water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
- March 28 20:30 Switched to the water injection to the core using a temporary motor-driven pump.

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**Current Conditions**: Fresh water is being injected to the Spent Fuel Pool and the Reactor Core

- Reactor Pressure A -0.071MPa* (under monitoring of the change of the situation)
- Reactor Pressure C -0.005MPa* (under monitoring of the change of the situation)
- Condition: Almost no change
- Reactor Water Temperature A -2.050nm (under monitoring of the change of the situation)
- Reactor Water Level B -2.300mm (under monitoring of the change of the situation)
- Condition: Uncovering of the core from the top of the active fuel to the levels described above
- Reactor Water Temperature -℃
- Condition: No data available
- Reactor Pressure Vessel (RPV)
- Temperature Feedwater Nozzle Temperature : 137.2℃
- Condition: (under monitoring of the change of the situation)
- Temperature at the bottom head of RPV : 111.9℃
- PCV Pressure 0.1016MPa* (changed the monitor from 05:00 July 16)

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**Spent Fuel Pool Cooling System**

- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C
- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C

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**External Power**

- Power supply vehicle, Temporary DGs
- Two lines secured

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**Spent Fuel Pool Water Temperature 32.7 ℃**

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**EDG*2**

- Power supply vehicle, Temporary DGs
- Injecting freshwater by temporary motor-driven pump

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**RHRS*1**

- Injecting freshwater by temporary motor-driven pump

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**S/P*4**

- Water Temperature A
- Water Temperature B
- Pressure 0.1841MPa
- Condition: Almost no change

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**Condition of Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)**

- Conditions of the Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)
- Reactor Pressure A -0.071MPa* (under monitoring of the change of the situation)
- Reactor Pressure C -0.005MPa* (under monitoring of the change of the situation)
- Condition: Almost no change
- Reactor Water Temperature A -2.050nm (under monitoring of the change of the situation)
- Reactor Water Level B -2.300mm (under monitoring of the change of the situation)
- Condition: Uncovering of the core from the top of the active fuel to the levels described above
- Reactor Water Temperature -℃
- Condition: No data available
- Reactor Pressure Vessel (RPV)
- Temperature Feedwater Nozzle Temperature : 137.2℃
- Condition: (under monitoring of the change of the situation)
- Temperature at the bottom head of RPV : 111.9℃
- PCV Pressure 0.1016MPa* (changed the monitor from 05:00 July 16)

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**Spent Fuel Pool Cooling System**

- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C
- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C

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**External Power**

- Power supply vehicle, Temporary DGs
- Two lines secured

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**EDG*2**

- Power supply vehicle, Temporary DGs
- Injecting freshwater by temporary motor-driven pump

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**RHRS*1**

- Injecting freshwater by temporary motor-driven pump

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**S/P*4**

- Water Temperature A
- Water Temperature B
- Pressure 0.1841MPa
- Condition: Almost no change

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**Condition of the Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)**

- Conditions of the Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)
- Reactor Pressure A -0.071MPa* (under monitoring of the change of the situation)
- Reactor Pressure C -0.005MPa* (under monitoring of the change of the situation)
- Condition: Almost no change
- Reactor Water Temperature A -2.050nm (under monitoring of the change of the situation)
- Reactor Water Level B -2.300mm (under monitoring of the change of the situation)
- Condition: Uncovering of the core from the top of the active fuel to the levels described above
- Reactor Water Temperature -℃
- Condition: No data available
- Reactor Pressure Vessel (RPV)
- Temperature Feedwater Nozzle Temperature : 137.2℃
- Condition: (under monitoring of the change of the situation)
- Temperature at the bottom head of RPV : 111.9℃
- PCV Pressure 0.1016MPa* (changed the monitor from 05:00 July 16)

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**Spent Fuel Pool Cooling System**

- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C
- Reactor Water Level A
- Reactor Water Level B
- Reactor Pressure C

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**External Power**

- Power supply vehicle, Temporary DGs
- Two lines secured

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**EDG*2**

- Power supply vehicle, Temporary DGs
- Injecting freshwater by temporary motor-driven pump

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**RHRS*1**

- Injecting freshwater by temporary motor-driven pump

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**S/P*4**

- Water Temperature A
- Water Temperature B
- Pressure 0.1841MPa
- Condition: Almost no change

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**Condition of the Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)**

- Conditions of the Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 12:00 July 18, 2011)
- Reactor Pressure A -0.071MPa* (under monitoring of the change of the situation)
- Reactor Pressure C -0.005MPa* (under monitoring of the change of the situation)
- Condition: Almost no change
- Reactor Water Temperature A -2.050nm (under monitoring of the change of the situation)
- Reactor Water Level B -2.300mm (under monitoring of the change of the situation)
- Condition: Uncovering of the core from the top of the active fuel to the levels described above
- Reactor Water Temperature -℃
- Condition: No data available
- Reactor Pressure Vessel (RPV)
- Temperature Feedwater Nozzle Temperature : 137.2℃
- Condition: (under monitoring of the change of the situation)
- Temperature at the bottom head of RPV : 111.9℃
- PCV Pressure 0.1016MPa* (changed the monitor from 05:00 July 16)
May 2 12:58 ~ 15:03 The pump for the injection of water into the Reactor Core was temporarily replaced with the Fire Extinguishing Pump in order to install an alarm device in the pump.

May 8 16:18 ~ May 10 5:41 Transferred the water in the Condenser to the underground of the turbine building in order to carry out piping work of Reactor Feedwater System.

May 11 08:47~15:55 Due to the restoration of the Okuma No.2 transmission line, the power supply for the water injection pump into the reactor was temporarily switched to the temporary diesel generator.

May 11 around 12:30 Confirmed the water flow into the pit around intake of sea water through conduit pipe of electric power cables → 16:05 Confirmed the water leakage from the pit to the sea → 18:45 Stopped the water leakage by casting concrete into the pit.

May 12 16:53 In addition to the plumbing pro-fire extinguishing, started core flooding from the plumbing pro-water supply.

May 15 14:33~17:00 Injected borated water to the Reactor Core.

May 17 18:04~ Started transfer of accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities

May 18 from around 16:30 Conducted preliminary survey in the Reactor Building for about 10 minutes.

May 25 09:10 Suspended transfer of accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities in order to check the transfer line and in the turbine building.

May 28 20:54 Terminated to inject water to the Reactor Core via Fire Extinguishing line.

May 31 09:00 ~ 16:00 A preliminary survey using a remote-controlled robot was carried out inside the reactor building.

May 31 10:19 Changed the rate of water injection into the Reactor Core from 13.5m$^3$/h to 12.5m$^3$/h.

June 1 10:10 Changed the rate of water injection into the Reactor Core from 12.5m$^3$/h to 11.5m$^3$/h.

June 2 12:50 ~ June 4 21:56 Transferred the accumulated water from the Condenser to the CST in order to prepare transferring of accumulated water in the basement of the turbine building.

June 3 13:16 ~ 13:32 Suspended the injection of coolant water due to the work for changing the route of water supply line to the Reactor Core.

June 5 18:26 ~ June 9 10:44 Transferred the accumulated water from inside the turbine building to the Condenser.

June 9 11:47 ~ 12:14 Entered into the reactor building and monitored radiation dose etc.

June 11 15:30 ~ June 12 17:01 Transferred the accumulated water from the basement of the turbine building to the Radioactive Waste Treatment Facilities.

June 14 10:05 ~ June 16 08:46 Started transfer of accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities.

June 14 13:02 ~ 13:31 Suspended water injection to replace the hose of water injection into the reactor.

June 18 13:31 ~ June 20 00:02 Transferred of accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities.

June 19 11:03 ~ 15:22 Due to preparation for the suspension works of the Okuma No.2 transmission line, the power supply for the water injection pump into the Reactor Core was temporarily switched to the diesel generator.

June 21 10:06 The water injection rate into the reactor was changed from about 11.0m$^3$/h to about 10.0m$^3$/h.


June 23 10:13 The water injection rate into the reactor was changed from about 10.0m$^3$/h to about 9.5m$^3$/h.

June 24 10:07 The water injection rate into the reactor was changed from about 9.5m$^3$/h to about 9.0m$^3$/h.

June 24 10:31~12:42 A radiation dose survey was carried out by a robot in the reactor building.

June 27 08:08 ~ 14:38 Due to preparation for the restoration works of the Okuma No.2 transmission line, the power supply for the water injection pump into the Reactor Core was temporarily switched to the diesel generator.

June 27 16:20 Started use of water treated in the water treatment facilities for injection into the reactor, in addition to water injection from the filtered water tank. Suspended supply of treated water because of a leakage from the pipe (17:55). Started the treated water transfer pump (June 28 14:36). Resumed of treated water (June 28 14:36).

June 28 17:00 ~ June 28 09:58 Started to transfer of accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities.
June 29 10:59～13:33  Regarding the Circulating Injection Cooling of the Reactor Cores, supply of treated water was temporarily suspended due to leakage from a pipe for injection cooling.

June 30 08:56 ～ Started transfer of the accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities.
June 30 10:43 Implemented leakage test for primary line of the alternative cooling system for the Spent Fuel Pool. Trial operation was started. (18:33)

July 1 07:27 ～ Temporarily suspended supply of treated water into the reactor due to works to install and connect a buffer tank.
July 1 11:00 Started full-fledged operation of the alternative cooling system for the Spent Fuel Pool.
July 1 11:43 ～ 16:36 Carried out cleaning work in the reactor with a robot.
July 3 08:30 ～16:00 Installed 51 steel plates near the large object delivery entrance of the reactor building.
July 8 13:35 ～ 13:44 Workers entered the reactor building, and implemented a preliminary survey of the point for nitrogen injection.
July 9 15:22 Flushing was carried for the transfer line of the accumulated water from the basement of the turbine building to the Radioactive Waste Treatment Facilities.
July 14 20:01  Nitrogen injection started
July 16 10:50～ Resumed transfer of the accumulated water in the basement of the turbine building to the Radioactive Waste Treatment Facilities.
July 18 08:30～ Started installation work of temporary roof over the openings at the rooftop of the turbine building.

<Water spray over the Spent Fuel Pool by Concrete Pump Truck (Fresh water)>

March 29 14:17～18:18, March 31 16:30～19:33, April 2 09:52～12:54, April 4 17:03～19:19, April 7 06:53 ～08:53, April 8 17:06～20:00, April 10 17:15～19:15, April 12 16:26～17:16, April 14 15:56～16:32, April 18 14:17～15:02, April 22 14:19～15:40, April 26 12:25～14:02

<Fresh water injection to SFP via FPC (using the temporary motor-driven pump)>

May 8 12:10 ～14:10, May 9 12:14 ～15:00 (12:39 ～14:36 Hydrazine was also injected), May 16 15:00～18:32 (15:10 ～17:30 Hydrazine was also injected), May 24 10:15～13:35 (10:20 ～12:56 Hydrazine was also injected), May 28 13:28～15:08(13:42 ～14:40 Hydrazine was also injected), June 1 14:34～15:54(14:41 ～15:26 Hydrazine was also injected), June 5 13:08～15:14(13:14～14:16 Hydrazine was also injected), June 9 13:42～15:31 (13:45～14:40 Hydrazine was also injected), June 13 10:09～11:48 (10:13～11:36 Hydrazine was also injected), June 17 10:19～11:57 (10:23～11:31 Hydrazine was also injected), June 26 09:56～11:23 (Borated water was injected ), June 27 15:00～17:18 (Borated water was injected ), June 29 14:45～15:53

<Cooling by the alternative cooling system for the Spent Fuel Pool>

July 1 11:00 ～ July 8 08:20, July 8 14:24 ～
In periodic inspection outage when the earthquake occurred
March 14  04:08 Water temperature in the Spent Fuel Pool (SFP), 84℃
March 15  06:14 Confirmed the partial damage of wall in the 4th floor.
March 15  09:38 Fire occurred in the 3rd floor. (12:25 extinguished)
March 16  05:45 Fire occurred. TEPCO couldn’t confirm any fire on the ground. (06:15)
March 20  08:21～09:40 Water spray over SFP by Self-Defense Force
March 20  around 18:30～19:46 Water spray over SFP by Self-Defense Force
March 21  06:37～08:41 Water spray over SFP by Self-Defense Force
March 21  around 15:00 Work for laying cable to Power Center was completed.
March 22  10:35  Power Center received electricity.
March 25  06:05～10:20 Sea water injection to SFP via the Fuel Pool Cooling Line (FPC)
March 29  11:50 Lighting in the Central Control Room was recovered.
April 11  around 17:16  An earthquake occurred (at Hamadori in Fukushima Prefecture).
April 12  12:00～13:04  Sampled the water in SFP.
April 19  10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.
April 22  Measured the water level of SFP by a gauge hung on Concrete Pump Truck (62m class).
April 30  11:34  Completed reinforcement work of the power supply both Units 3, 4. (Increasing the voltage from 6.6kv to 66kv)
May 9  Started installation work of the supporting structure for the floor of SFP
June 10  around 14:00～(about 30 minutes) Workers entered the RB and conducted a survey of working environment for the construction work on the SFP circulating cooling system.
June 29  13:28～14:21 Workers entered the RB and conducted a survey of working environment for the construction work on the SFP circulating cooling system.
July 6  10:20 ～10:30 Carried out preparation for installation work of the alternative cooling system for the Spent Fuel Pool.
July 8  10:00 ～11:30 Regarding the installation works of the alternative cooling system for the Spent Fuel Pool, the examination of the integrity of the pipes was conducted.

Major Events after the Earthquake 1/2

*1 Residual Heat Removal System
*2 Emergency Diesel Generator
*3 Reactor Pressure Vessel

*Described temporary thermo-couple readings (As of 16:00, July 17)
**Major Events after the Earthquake 2/2**

**<Water spray by Concrete Pump Truck (Seawater)>**

**<Water spray by Concrete Pump Truck (Fresh water)>**
March 30 14:04-18:33, April 1 08:28-14:14, April 3 17:14-22:16, April 5 17:35-18:22, April 7 18:23-19:40, April 9 17:07-19:24, April 13 00:30-6:57, April 15 14:30-18:29, April 17 17:39-21:22, April 19 10:17-11:35, April 20 17:08-20:31, April 21 17:14-21:20, April 22 17:52-23:53, April 23 12:30-16:44, April 24 12:25-17:07, April 25 18:15-April 26 0:26, April 26 16:50-20:35, April 27 12:18-15:15, May 5 12:29-20:46, May 6 12:38-17:51, May 7 14:05-17:30, May 9 16:05-19:05 (16:11-18:38 Hydrazine was also injected), May 11 16:07-19:38 (16:14 -19:36 Hydrazine was also injected), May 13 16:04~19:04 (16:20 -18:41 Hydrazine was also injected), May 15 16:25-20:25 (16:26-18:30 Hydrazine was also injected), May 17 16:14-20:06 (16:40-18:35 Hydrazine was also injected), May 19 16:30-19:30, May 21 16:00-19:56 (16:23 -19:00 Hydrazine was also injected), May 23 16:00-19:09 (16:08 -18:30 Hydrazine was also injected), May 25 16:36-20:04 (16:42-18:49 Hydrazine was also injected), May 27 17:05-20:00 (17:24 -18:53 Hydrazine was also injected), May 28 17:56-19:45(18:02-19:45 Hydrazine was also injected), June 3 14:35-21:15 (14:44-18:58 Hydrazine was also injected), June 4 14:23-19:45(14:51-18:41 Hydrazine was also injected), June 6 15:56-18:35(16:15-17:45 Hydrazine was also injected), June 8 16:12-19:41(16:16-18:05 Hydrazine was also injected), June 13 16:36-21:00(16:38-19:15 Hydrazine was also injected), June 14 16:10~20:52(16:11~19:15 Hydrazine was also injected)

**<Water spray by temporary water spraying equipment (Fresh water)>**
June 16 13:14~15:44 (13:48~15:18 Hydrazine was also injected), June 18 16:05~19:23 (16:29~18:33 Hydrazine was also injected), June 22 14:31~16:38, June 30 11:30 ~11:55

**<Water filling to the reactor well and temporary storage pool (DSP)>**
June 19 09:14~11:57, June 20 09:49~09:52, June 20 10:06~June 21 11:29, June 21 11:45~12:52,
Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 5
(As of 12:00 July 18, 2011)

**In periodic inspection outage**

- **Water Temperature in the Pool:** 29.3°C
- **Condition:** Recovery of heat removal function

**Spent Fuel Pool Cooling System**
- Removing heat through existing cooling system.

**External Power**
- Two lines secured
- Share two EDGs of Unit 6
- Two EDGs of Unit 5

**EDG**
- RHRS

**RHRS**
- *1 Residual Heat Removal System
- *2 Emergency Diesel Generator

**Reactor Pressure Vessel**
- **Temperature:** Monitoring by Reactor Water Temperature

**Reactor Pressure:** 0.111MPa*
**Reactor Water Level:** 1,973mm
**Reactor Water Temperature:** 26.7°C
**Condition:** Pressure is under control.
*converted to absolute pressure

**Major Events after the Earthquake 1/2**

- March 20 14:30 Cold shutdown
- March 21 11:36 Receiving electricity from external power supply
- March 23 17:24 Pump for Residual Heat Removal Seawater System (RHRS) was automatically stopped when the power supply was switched from the temporary to the permanent.
- March 24 16:14 Repair of the RHRS pump was completed.
- March 24 16:35 Started to cooling.
- April 4 21:00 ~ April 8 12:14 Discharged the groundwater with low-level radioactivity in the Sub Drain Pit to the sea (around 950 ton).
- April 25 12:22 ~ 16:43 For reinforcement work of the power supply, the pump for Residual Heat Removal (RHR) was temporarily stopped.
- April 25 14:44 ~ 17:38 Implemented reinforcement work of the power supply (connection of the power supplies between Units 1-2 and Units 5-6).
- May 2nd 13:30 ~ 15:03 The pump for RHR was temporarily shut off in order to test the Start-up Transformer for power reception.
- May 28 around 21:14 Confirmed shutdown of the RHRS pump
- May 29 08:12 Started to replace with the temporary RHRS Spare Pump
- May 29 12:31 Started the RHRS Pump
- May 29 12:49 Started to cool the Reactor Core by RHR
- June 8 08:46 ~ 12:35 RHRS pump etc were temporarily stopped due to the installation of one more pump for RHRS.
- June 24 16:35 Cooling of the Spent Fuel Pool was started using the Fuel Pool Cooling and Clean-up System.
- June 27 18:03 EDG(5A) recovery to standby mode.
- June 28 12:32 EDG(5B) recovery to standby mode.
- June 30 10:02 ~ 11:48 Temporarily suspended RHR pump due to switching power supply of the ancillary equipment.
- July 3 10:00 ~ 13:36 Temporarily suspended RHR pump due to the work for exchanging the outlet (10:20 ~ 13:22, the temporary pump of RHRS (B) was temporarily suspended)
- July 3 10:15 ~ 13:40 The pump of RHRS was temporarily suspended
- July 11 Due to restoration work of Yonomori line for duplication of line, D/G5A started up (03:03) and shut off (09:07). D/G5B started up (03:37) and shut off (14:44).
- July 11 5:01 ~ 13:44 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was suspended.
- July 13 6:30 ~ 10:58 Temporarily suspended RHR pump operation due to the work for exchanging RHRS pump horse

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)
July 15 Implemented trial run of the pump of RHRS (D) (10:16). The pump of RHR (C) shut off (14:25). The pump of RHR (D) started up (14:45).
July 16 Due to restoration work of Yonomori line for duplication of line, D/G5B started up (04:01) and shut off (13:05).
July 16 05:28～12:05 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was temporarily suspended.
July 17 Due to restoration work of Yonomori line for duplication of line, D/G5B started up. (03:08)
July 17 04:24～13:20 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was temporarily suspended.
Conditions of Fukushima Dai-ichi Nuclear Power Station **Unit 6**  
(As of 12:00 July 18, 2011)

**Major Events after the Earthquake 1/2**

- March 20 19:27 Cold shutdown
- March 22 19:17 Receiving electricity from external power supply
- April 4 21:00～April 9 18:52 Discharged the groundwater with low-level radioactivity in the Sub Drain Pit to the sea (around 373 ton).
- April 19 11:00～15:00 Transferred accumulated water under the base of the turbine building to the condenser for measuring the amount of it.
- April 20 09:51～15:56 The pump for Residual Heat Removal (RHR) was temporarily stopped in order to change the position of the hose of the temporary RHR Seawater System.
- April 25 14:44～17:38 Implemented reinforcement work of the power supply (connection of the power supplies between Units 1-2 and Units 5-6).
- May 2 11:03 ～ 14:53 The pump for RHR was temporarily shut off in order to test the Start-up Transformer for power reception.
- June 28 Around 12:00 Confirm a leakage of water in a low radioactive concentration from the temporarily tank which stored accumulate water from the basement of the turbine building.
- July 11 Due to restoration work of Yonomori line for duplication of line, D/G6A started up (04:17) and shut off (15:42). DG6B started up (04:31) and shut off (16:36).
- July 11 05:01 ～13:44 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was temporarily suspended.
- July 16 Due to restoration work of Yonomori line for duplication of line, D/G6B started up (04:21) and shut off (13:51).
- July 16 05:28 ～12:05 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was temporarily suspended.
- July 17 Due to restoration work of Yonomori line for duplication of line, the power supply from the Yonomori line was temporarily suspended.

〈Transferred accumulated water on the basement floor of the turbine building to the temporary tank〉

- May 1 14:00 ～17:00 , May 2 10:00 ～16:00 , May 3 14:00 ～17:00 , May 6 14:00 ～17:00 , May 7 10:00 ～15:00 , May 9 14:00 ～17:00 , May 10 10:00 ～16:00 , May 11 10:00 ～16:00 , May 12 10:00 ～16:00 , May 13 10:00 ～15:00 , May 14 10:00 ～15:00 , May 15 10:00 ～15:00 , May 16 10:00 ～14:00 , May 17 10:00 ～14:00 , May 18 10:00 ～14:00 , May 21 14:00 ～18:00 , May 24 09:00 ～19:00 , May 25 09:00 ～19:00 , May 26 09:00 ～19:00 , May 27 09:00 ～19:00 , May 28 09:00～19:00,
Major Events after the Earthquake 2/2

May 29 09:00～19:00, May 30 10:00～17:30, June 2 14:00～(June 5 14:00 ～14:45 temporarily suspended)～June 8 18:00, June 9 09:00～18:00, June 11 10:00～15:00, June 12 10:00～15:00 , June 13 10:00～16:00, June 14 10:00～16:00, June 15 10:09～16:00, June 16 10:00～16:00, June 17 10:00～16:00, June 18 10:00～16:00, June 19 10:00～16:00, June 20 10:00～16:00, June 21 10:00～16:00 , June 22 10:00～16:00, July 1 10:00 ～July 2 16:00, July 4 10:00～16:00, July 5 10:30～16:30, July 6 10:00 ～17:00, July 7 10:30 ～16:30, July 8 10:30 ～16:30, July 9 10:30 ～16:30, July 11 10:30 ～16:30

〈Transferred accumulated water on the basement floor of the reactor building to the Radioactive Waste Treatment Building〉
May 10 11:00 ～12:30, May 11 11:00 ～12:30, May 12 10:30～12:30,
May 13 11:30 ～12:15, May 18 10:30 ～12:30, May 28 10:20～12:10
June 8 10:05 ～12:40, June 15 11:55～14:00, June 21 11:05～13:30, June 28 11:00～13:20, July 6 08:45～10:50, July 13 8:40～10:50

〈Transferred accumulated water from the temporary tank to the Mega-Float〉
June 30 13:00 ～19:00, July 1 10:00 ～July 3 16:00 , July 4 13:30～17:00,
July 5 10:00～17:00, July 7 10:09～17:00, July 8 10:00 ～ 17:00, July 9 10:00～17:00, July 11 10:00～17:00 , July 12 11:00～16:00, July 13 10:00～17:00, July 14 10:00～17:00, July 15 10:00～17:00, July 16 10:00～15:00