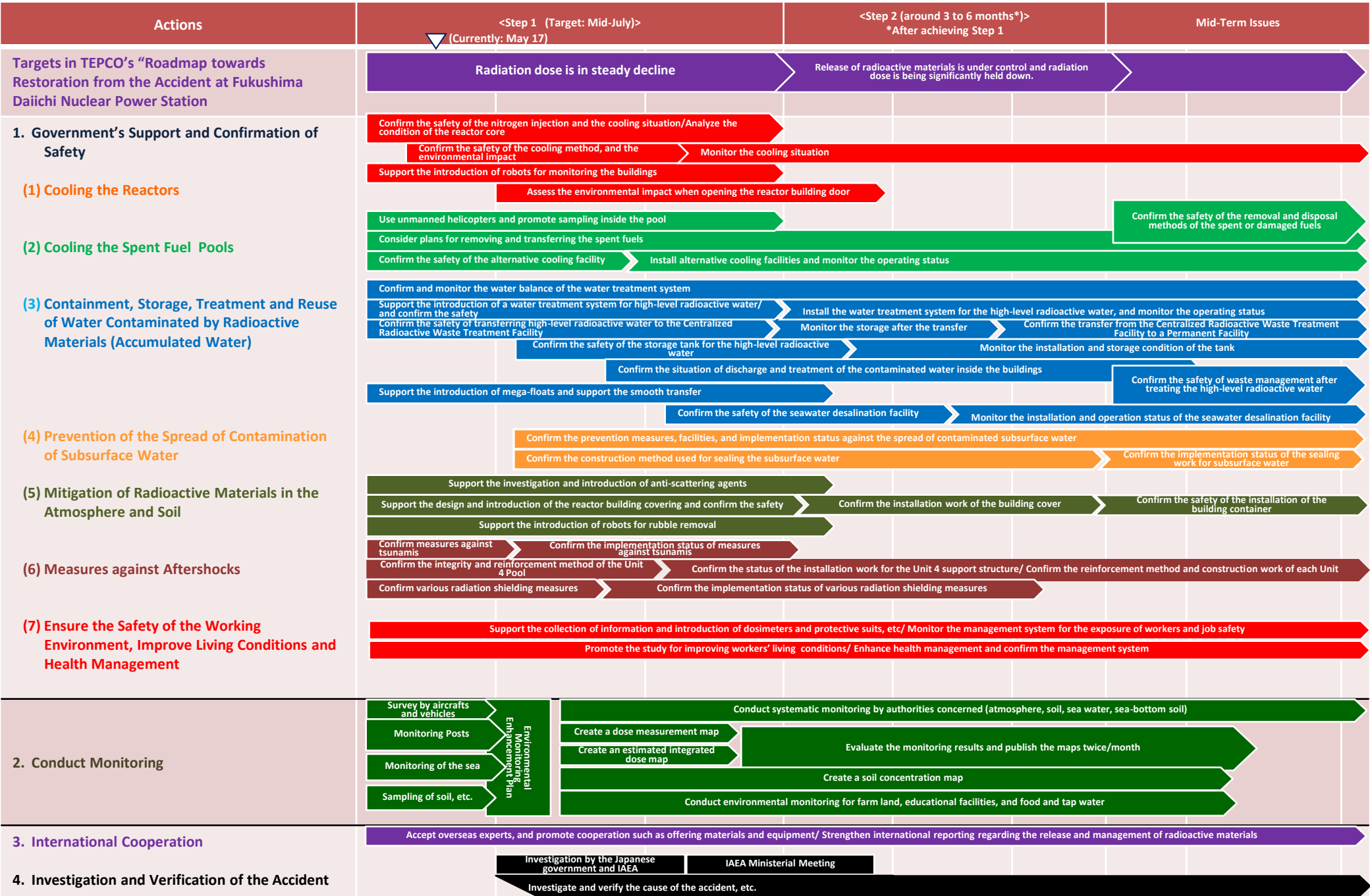
Roadmap for Immediate Actions for the Verification of and Restoration from the Accident at Fukushima Dai-ichi Nuclear Power Station

Document 1 May 17, 2011

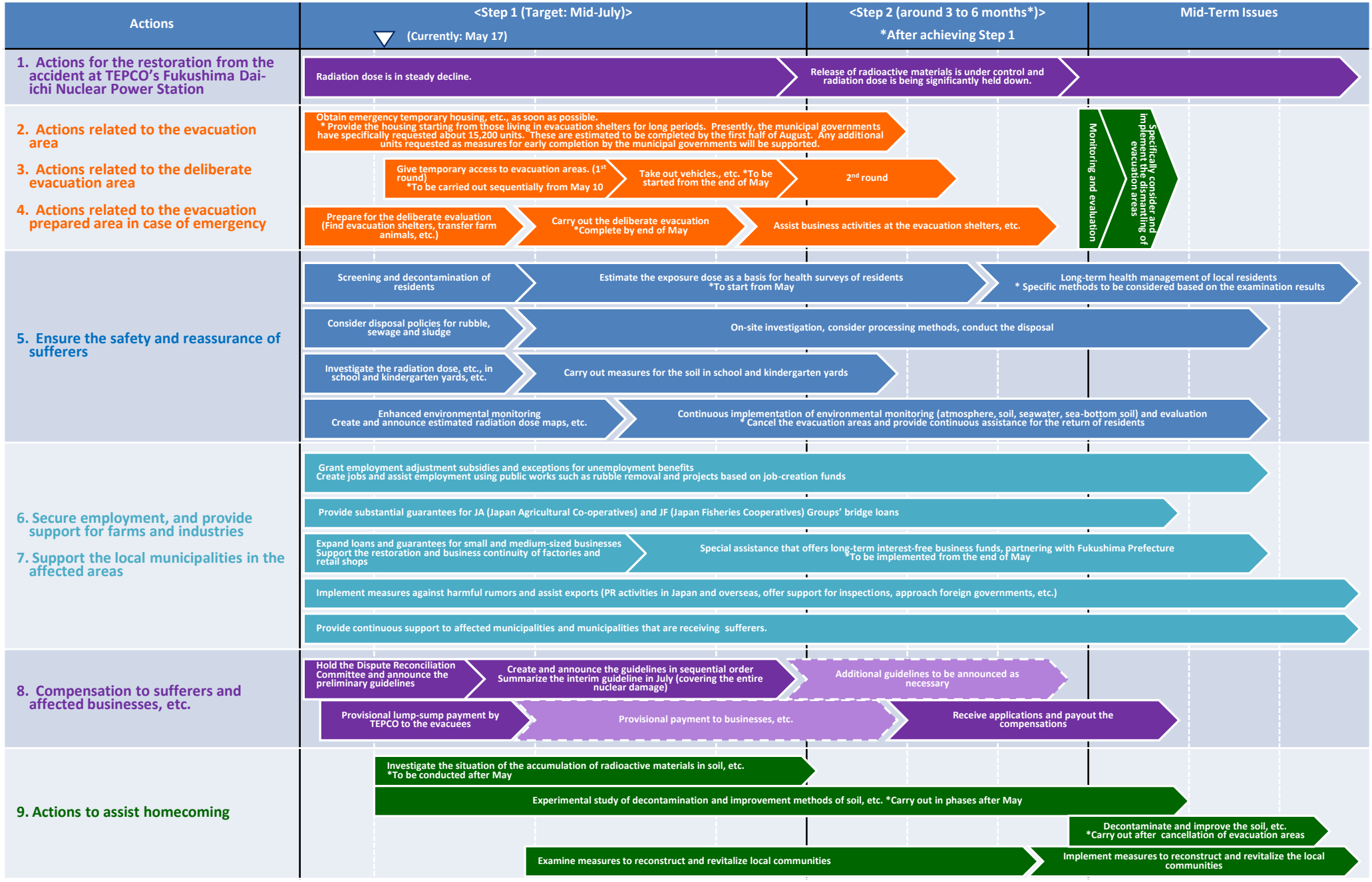
Nuclear Emergency Response Headquarters



Roadmap for Immediate Actions for the Assistance of Nuclear Sufferers

Document 2

May 17, 2011
Nuclear Emergency Response Headquarters



News Release

経済産業省
Ministry of Economy, Trade and Industry

Extract

May 13, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 137th Release)
(As of 12:00 May 13, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPSs)
   - Fukushima Dai-ichi NPS
     - In addition to injecting water (about 9m^3/h) into the Reactor Core of Unit 3 using the pipe of the Fire Extinguishing Line, injection of water into the Reactor Core was also started using the pipe of the Feedwater System (about 3m^3/h). (16:53 May 12)
     - The accumulated water in the basement of the turbine building of Unit 6 was transferred to a temporary tank (about 120m^3). (From 10:00 till 16:00 May 12)
     - The accumulated water in the basement of the reactor building of Unit 6 was transferred to a Radioactive Waste Treatment Facilities building of the same Unit (about 7.5m^3). (From 10:30 till 12:30 May 12)
     - The transfer of the accumulated water from the basement of the turbine building of Unit 6 to a temporary tank was started. (10:00 May 13)
     - The transfer of the accumulated water from the basement of the reactor building of Unit 6 to the Radioactive Waste Treatment Facilities building of the same Unit was started. (11:30 May 13)
     - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out by workers in an area of about 5,250m^2 around the Solid Waste Storage and South Seawall. (From 10:30 till 14:00 May 12)

- Removal of rubble (an amount equivalent to 4 containers) was carried out by remote-controlled heavy machinery. (From 09:00 till 16:00 May 12)
- In order to reinforce the power supply for Units 3 and 4, the 480V power distribution panel for Unit 4 and the Common Spent Fuel Pool was reconnected in order to receive power from Tohoku Electric Power Company's Tohden Genshiryoku line (66kV) instead of the Okuma No.3 power transmission line.

<Instructions Regarding Foods and Drinks>

- Additional item subject to the restriction on distribution.

- Bamboo shoots produced in Minamisoma City, Motomiya City, Koori Town, Kunimi Town, Kawamata Town and Nishigo Village.

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

News Release

経済産業省
Ministry of Economy, Trade and Industry

Extract

May 15, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 139th Release)
(As of 14:00 May 15, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPSs)
   - Fukushima Dai-ichi NPS
     - Fresh water was sprayed over the Spent Fuel Pool of Unit 1 using a Concrete Pump Truck (62m class). (From 15:07 till 15:18 May 14; after that it was discontinued because of strong winds.)
     - Transfer of the accumulated water from the basement floor of the turbine building of Unit 6 to a temporary tank was started. (At 10:00 May 15)
     - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out by workers in an area of about 5,250m^2 around the Solid Waste Storage, South Seawall and the Observation Deck. (From 10:30 till 14:00 May 14)
     - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out using an unmanned crawler dump in an area of about 7,000m^2 on the east side of the turbine building of Unit 2. (From 11:00 till 15:00 May 14)
     - Removal of rubble (an amount equivalent to 7 containers) was carried out by remote-controlled heavy machinery. (From 09:00 till 16:00 May 14)
     - The Mega-Float had left Yokohama. (At 05:20 May 15)
     - Around 6:50 in the morning May 14, a subcontractor's worker felt

discomfort during the work related to water processing (work for conveyance of equipments) in the Radioactive Waste Treatment Facilities of Fukushima Dai-ichi NPS. As the worker became unconscious and did not have a spontaneous respiration, he was transported to J-Village. After examined by a doctor there, he was taken to Iwaki Kyoritsu General Hospital by ambulance. In addition, as a result of the body survey, it was confirmed that no contamination of radioactive materials was detected.
Later, the worker was confirmed dead at 09:33.

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

News Release

経済産業省
Ministry of Economy, Trade and Industry

Extract

May 16, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information (the 140th Release)
(As of 12:00 May 16, 2011)

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPSs)
   - Fukushima Dai-ichi NPS
     - The rate of water injection into the Reactor Core of Unit 1 was changed from 8 m^3/h to 10 m^3/h (13:28 May 15)
     - Borated water was injected to the RPV of Unit 3 (From 14:33 till 17:00 May 15)
     - About 100t of fresh water was sprayed over the Spent Fuel Pool of Unit 4 using a Concrete Pump Truck (62m class). (From 16:25 till 20:25 May 15) (About 0.3m^3 of hydrazine was also injected from 16:26 till 18:30.)
     - The accumulated water inside the basement of the turbine building of Unit 6 was transferred to a temporary tank. (From 10:00 till 15:00 May 15)
     - Transfer of the accumulated water from the basement of the turbine building of Unit 6 to a temporary tank was started. (From 10:00 May 15)
     - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out by workers in an area of about 7,000m^2 around the Solid Waste Storage, around the Controlled Landfill Site, the Observation Deck and the sports ground. (From 9:00 till 14:00 May 15)
     - Removal of rubble (an amount equivalent to 5 containers) was carried out by remote-controlled heavy machinery. (From 09:00 till

16:00 May 15)

2. Actions Taken by NISA

・ May 15 – NISA evaluated TEPCO's report on the transfer of the drainage water with high-level radioactivity from the basement of the turbine building of Unit 3, Fukushima Dai-ichi NPS, to the Main Building of the Radioactive Waste Treatment Facilities, and determined that the measure was necessary to prevent radiation hazards. In addition, NISA directed TEPCO to do the following:

- With regard to the transfer of accumulated water to the Main Process Building and to the High Temperature Incinerator Building, the action plan described in TEPCO's report as well as concrete measures to ensure safety shall be infallibly carried out, focusing on the prevention of leakage during the transfer process, management and monitoring of water levels of the accumulated drainage water, and reduction of the exposure of workers.
- Due to the fact that neither the Main Process Building or the High Temperature Incinerator Building were originally installed for the purpose of storing accumulated drainage water, TEPCO shall consider when to terminate the use of these buildings based on the progress of the installation of treatment facilities, and shall report the outcome to NISA.

In order to conduct the above evaluation, NISA's nuclear safety inspectors were present whenever necessary, to confirm the work conducted by TEPCO such as the inspection of the integrity of the High Temperature Incinerator Building in the Building of the Radioactive Waste Treatment Facilities, the sealing work to prevent any post-transfer leakage, and the work to ensure safety such as laying water transfer pipes.

＜Instructions Regarding Foods and Drinks＞

- The suspension of shipment was lifted for the following districts and items.
  - Shiitake mushroom (limited to those grown on raw lumber in open fields) of Tamura City (excluding the area within 20-km radius of the Fukushima Dai-ichi NPS) and Shinchi Town of Fukushima Prefecture).

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

News Release

Extract

May 17, 2011
Nuclear and Industrial Safety Agency

Seismic Damage Information（the 141st Release）

（As of 8:00 May 17, 2011）

Nuclear and Industrial Safety Agency (NISA) confirmed the current situation of Onagawa NPS, Tohoku Electric Power Co. Inc.; Fukushima Dai-ichi and Fukushima Dai-ni NPSs, Tokyo Electric Power Co. Inc. (TEPCO); Tokai Dai-ni NPS, Japan Atomic Power Co. Inc. as follows:

Major updates are as follows.

1. Nuclear Power Stations (NPSs)

- Fukushima Dai-ichi NPS
  - About 106t of fresh water was injected into Spent Fuel Pool via a Fuel Pool Cooling and Clean-up Line for Unit3. (From 15:00 till 18:32 May 16) (0.88 m^3 of hydrazine was also injected from 15:10 till 17:30)
  - About 80 m^3 of accumulated water inside basement of the turbine building of Unit 6 was transferred to a temporary tank (From 10:00 till 14:00 May 16).
  - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out by workers in an area of about 6,520m^2 on the roads in front of the former Main Office Building, around the Controlled Landfill Site, the Observation Deck and the parking lot for the Seismic Isolated Building.
  - Full-scale implementation of spraying an anti-scattering agent in order to prevent the spread of radioactive materials was carried out by an unmanned crawler dump truck in an area of about 3,000 m^2 on the east side of the turbine building of Unit 1. (From11:00 till 15:45 May16)
  - Removal of rubber (an amount equivalent to 4 containers) using remote-controlled heavy machinery was carried out. (From 9:00 till 16:00 May 16)

3. What Nuclear and Industrial Safety Agency (NISA) has done

May 16

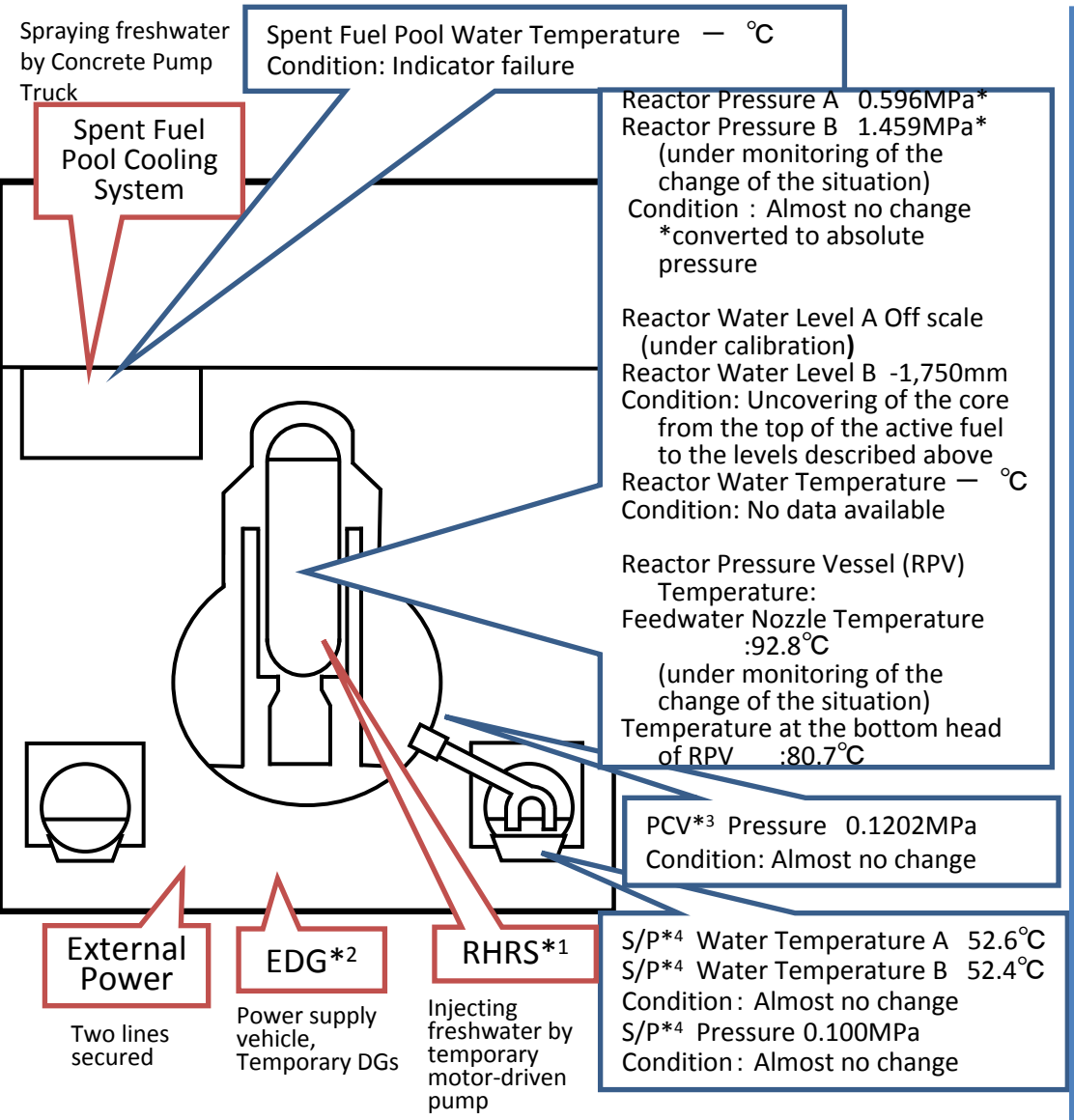
- NISA received from TEPCO the report regarding the accident records etc. related to Fukushima Dai-ichi Nuclear Power Station (NPS) pursuant to

Article 67, paragraph 1 of Nuclear Regulation Act, and determined that evaluation of the effect to the safety of nuclear reactor facilities was required by taking the record analysis before and after the earthquake into account in order to take emergency measures properly. Therefore, NISA directed TEPCO to submit a report of the evaluation of the effect to the safety of nuclear reactor facilities including water level record analysis for the rector pressure vessel before and after the 2011 Tohoku District-Off the Pacific Ocean Earthquake.

- NISA received from TEPCO the report regarding the record of damage situation of electric facilities inside and outside of Fukushima Dai-ichi NPS pursuant to Article 106, paragraph 3 of Electricity Business Act, and determined that clarification of the causes of damages to the electric facilities inside and outside of this power station after the earthquake and reasons why protective equipment of the electric power lines reacted and caused to suspend power supply in this power station. Therefore, NISA directed TEPCO to submit a report regarding following items.
  - The results of the investigation to find the causes that brought reported damages to the electric facilities inside and outside this power station after the earthquake.
  - The results of the investigation to find the reasons why protective equipment of Ohkuma 1 to 4 lines and Yorunomori 1 and 2 lines reacted and caused to suspend power supplies in this power station.

For more information: NISA English Home Page
http://www.nisa.meti.go.jp/english/index.html

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 1
（As of 6:00 May 17, 2011）



Spent Fuel Pool Water Temperature — ℃
Condition: Indicator failure

Reactor Pressure A 0.596MPa*
Reactor Pressure B 1.459MPa*
(under monitoring of the change of the situation)
Condition : Almost no change
*converted to absolute pressure

Reactor Water Level A Off scale
(under calibration)
Reactor Water Level B -1,750mm
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 :92.8℃
(under monitoring of the change of the situation)
Temperature at the bottom head of RPV :80.7℃

PCV*3 Pressure 0.1202MPa
Condition: Almost no change

S/P*4 Water Temperature A 52.6℃
S/P*4 Water Temperature B 52.4℃
Condition : Almost no change
S/P*4 Pressure 0.100MPa
Condition : Almost no change

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

Major Events after the Earthquake 1/2

March 11th 14:46 Under operation, Automatic shutdown by the earthquake
March 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
March 11th 16:36 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
March 12th 01:20 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
March 12th 10:17 Started to vent.
March 12th 15:36 Sound of explosion
March 12th 20:20 Started to inject seawater and borated water to the Reactor Core.
March 23rd 02:33 The amount of injected water to the Reactor Core was increased utilizing the Feedwater Line in addition to the Fire Extinguish Line. ($2m^3/h \rightarrow 18m^3/h$)
09:00 Switched to the Feedwater Line only.($18m^3/h \rightarrow 11m^3/h$)
March 24th 11:30 Lighting in the Central Control Room was recovered.
March 25th 15:37 Started to inject fresh water.
March 29th 08:32 Switched to the water injection to the Reactor Core using the temporary motor-driven pump.
March 31st 12:00 ～2nd 15:26 Started to transfer the stagnant water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
March 31st 13:03～16:04 Water spray by Concrete Pump Truck (Fresh water)
April 3rd 12:02 The power supply to the temporary motor-driven pump was switched from the temporary power supply to the external power supply.
April 3rd 13:55 Started to transfer the water from the Condenser to CST.
April 6th 22:30 Started the operation for the injection of nitrogen to PCV.
April 7th 01:31 Confirmed starting the injection of nitrogen to PCV.
April 9th 04:10 Started using highly pure nitrogen generator in the injection of nitrogen to PCV.
April 10th 09:30 Completed transferring the water from the Condenser to CST.
April 11th 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 11th 17:56 External power supply was recovered.
April 11th 18:04 Resumed injecting water to the Reactor Core.
April 11th 23:19 Restarted operation for injecting nitrogen to PCV.
April 11th 23:34 Confirmed starting injection of nitrogen to PCV.
April 17th 16:00～17:30 Confirmed the situation in the reactor building using an unmanned robot.
April 18th 11:50～12:12 Stopped the water injection into the reactor core to replace the current hose with a new one.
April 19th 10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.
April 25th 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 25th 14:10～19:10 Suspended nitrogen injection due to reinforcement work of the power supply.
April 25th 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 26th 11:35～13:24(approx.) Confirmed the situation in the reactor building using an unmanned robot.

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

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)

Major Events after the Earthquake 2/2

April 27th 10:02 Started the operation of gradually changing the amount of water for injection to the Reactor Pressure Vessel, (RPV) from about 6m^3/h to the maximum of about 14m^3/h. After carrying out the injection at 10m^3/h, the injection rate was changed back to 6m^3/h. (April 29th 10:14)

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

May 2nd 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 5th 16:36～May 8th 20:02 Operated all ambient filtration systems (a total of 6 units) in order to improve the working environment in the reactor building.

May 6th 10:01 Changed the rate of water injection into the Reactor Core from 6m^3/h to 8m^3/h.

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

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

May 9th 05:10 Disassembly of positive pressure house

May10th 10:55(approx.) Calibrated the reactor water level gauge

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

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

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

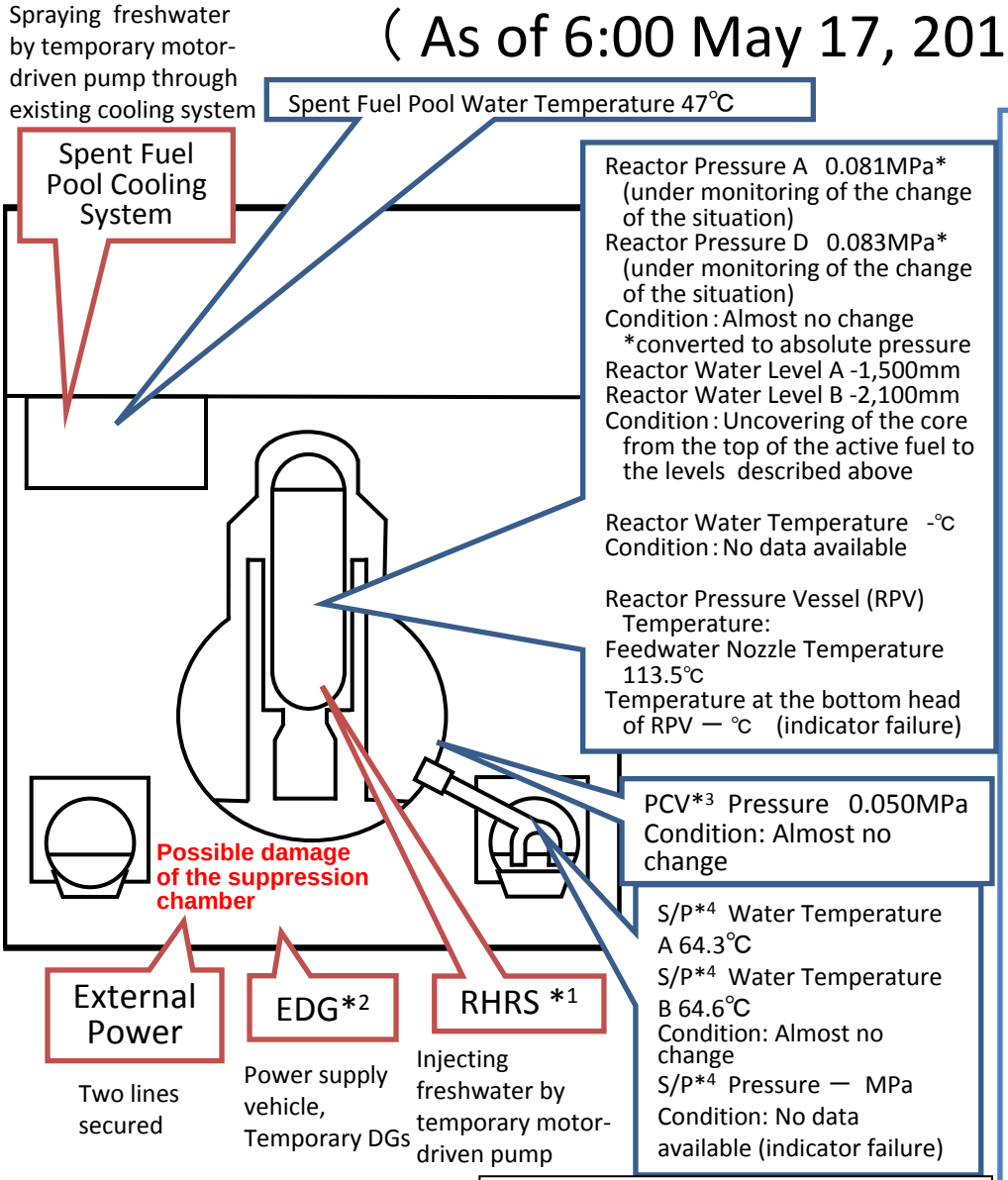
May 13th 16:01 ～17:39 Observed the situation in the Reactor Building using a remote-control robot

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

May 15th 13:28 Changed the rate of water injection into the Reactor Core from 8m^3/h to 10m^3/h.

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 2

（As of 6:00 May 17, 2011）



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

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

Major Events after the Earthquake 1/2

March 11th 14:46 Under operation, Automatic shutdown by the earthquake
March 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
March 11th 16:36 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System）
March 13th 11:00 Started to vent.
March 14th 13:25 Occurrence of the Article 15 event (Loss of reactor cooling functions)
March 14th 16:34 Started to inject seawater to the Reactor Core.
March 14th 22:50 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
March 15th 00:02 Started to vent.
March 15th 06:10 Sound of explosion
March 15th around 06:20 Possible damage of the suppression chamber
March 20th 15:05～17:20 Approximately 40 ton seawater injection to the Spent Fuel Pool (SFP) via the Fuel Pool Cooling Line (FPC)
March 20th 15:46 Power Center received electricity.
March 21st 18:22 White smoke generated. The smoke died down and almost invisible at 07:11 March 22nd.
March 22nd 16:07 Injection of around 18 tons of seawater to SFP
March 25th 10:30～12:19 Sea water injection to SFP via FPC
March 26th 10:10 Started to inject fresh water to the Reactor Core.
March 26th 16:46 Lighting in the Central Control Room was recovered.
March 27th 18:31 Switched to the water injection to the core using the temporary motor-driven pump.
March 29th 16:30～18:25 Switched to the temporary motor-driven pump injecting fresh water to SFP.
March 29th 16:45～1st 11:50 Transferred the water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
March 30th 9:25～23:50 Confirmed malfunction of the temporary motor-driven pump injecting fresh water to SFP(9:45). Switched to the injection using the fire pump Truck, but suspended as cracks were confirmed in the hose. (12:47, 13:10) Resumed injection of fresh water(19:05)
April 1st 14:56～17:05 Freshwater injection to SFP via FPC using the temporary motor-driven pump.
April 2nd around 9:30 The water, of which the dose rate was at the level of more than 1,000mSv/h, was confirmed to be collected in the pit located near the Intake Channel of Unit 2. The outflow from the lateral surface of the pit into the sea was also confirmed.
April 2nd 17:10 Started to transfer the water from the Condenser to the CST.
April 3rd 12:12 The power supply to the temporary motor-driven pump was switched from the temporary power supply to the external power supply.
April 3rd 13:47～14:30 20 bags of sawdust, 80 bags of high polymer absorbent and 3 bags of cutting-processed newspaper were put into the Pit for the Conduit.
April 4th 7:08～7:11 Approximately 13kg of tracer (bath agent) was put in from the Pit for the Duct for Seawater Pipe.
April 4th 11:05～13:37 Freshwater injection to SFP via FPC using the temporary motor-driven pump.
April 5th 14:15 Tracer is confirmed to outflow through the permeable layer around the pit into the sea. 15:07 Started to inject coagulant.
April 6th around 5:38 The water outflow from the lateral surface of the pit was confirmed to stopped.
April 7th 13:29～14:34 Freshwater injection to SFP via FPC using the temporary motor-driven pump.
April 9th 13:10 Completed transferring the water from the Condenser to CST.
April 10th 10:37～12:38 Freshwater injection to SFP via FPC using the temporary motor-driven pump .
April 11th around 17:16 Loss of external power supply due to an earthquake occurred (at Hamadori in Fukushima Prefecture). Water injection to the Reactor Core was suspended.
April 11th 17:56 External power supply was recovered.
April 11th 18:04 Resumed injecting water to the Reactor Core.

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)

Major Events after the Earthquake 2/2

April 12th 19:35～April 13th 17:04 Transfer from the trench of the turbine building to the Condenser.

April 13th 11:00 Suspended the transfer for checking leaks, etc.

April 13th 13:15～14:55 Freshwater injection to SFP via FPC using the temporary motor-driven pump.

April 16th 10:13～11:54 Freshwater injection to SFP via FPC using the temporary motor-driven pump. (The temporary motor-driven pump stopped at 11:39 due to an earthquake that occurred at around 11:19. SFP was confirmed to be filled to capacity through observing a rise of the water level in the Skimmer Tank.)

April 16th around 11:19 An earthquake occurred (in the southern part of Ibaraki Prefecture).

April 18th 13:42～ Confirmed the situation in the reactor building using an unmanned robot.

April 18th 12:13～12:37 Stopped the water injection into the reactor core to replace the current hose with a new one.

April 18th 09:30～17:40 Injected coagulant (soluble glass) into the power cable trench.

April 19th 08:00～15:30 Injected coagulant (soluble glass) into the power cable trench.

April 19th 10:08～ Started to transfer the stagnant water with high-level radioactivity from the trench of the turbine building to the Radioactive Waste Treatment Facility.

April 19th 10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.

April 19th 16:08～17:28 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

April 22nd 15:55～17:40 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

April 25th 10:12～11:18 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

April 25th 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 25th 10:12～11:18 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

April 25th 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 28th 10:15～11:28 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

April 29th 9:16 Suspended the transfer of stagnant water from the Turbine Building Trench of Unit 2 (Stagnant water with high-level radioactivity) to the Radioactive Waste Treatment Facility in order to carry out inspections, etc. of the transfer facilities. The transfer was resumed. (From 14:05 April 30th)

May 1st 13:35～ Started blocking the vertical shafts of Trench pit.

May 2nd 10:05～11:40 Injected freshwater into SFP via FPC using the temporary motor-driven pump.

May 2nd 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 6th 9:36～11:16 Injected freshwater into SFP via FPC using the temporary motor-driven pump.

May 7th 9:22 Suspended the transfer of stagnant water from the Turbine Building Trench of Unit 2 (Stagnant water with high-level radioactivity) to the Radioactive Waste Treatment Facility in order to carry out piping work of Reactor Feedwater System for Unit3. The transfer was resumed. (From 16:02 May 7th)

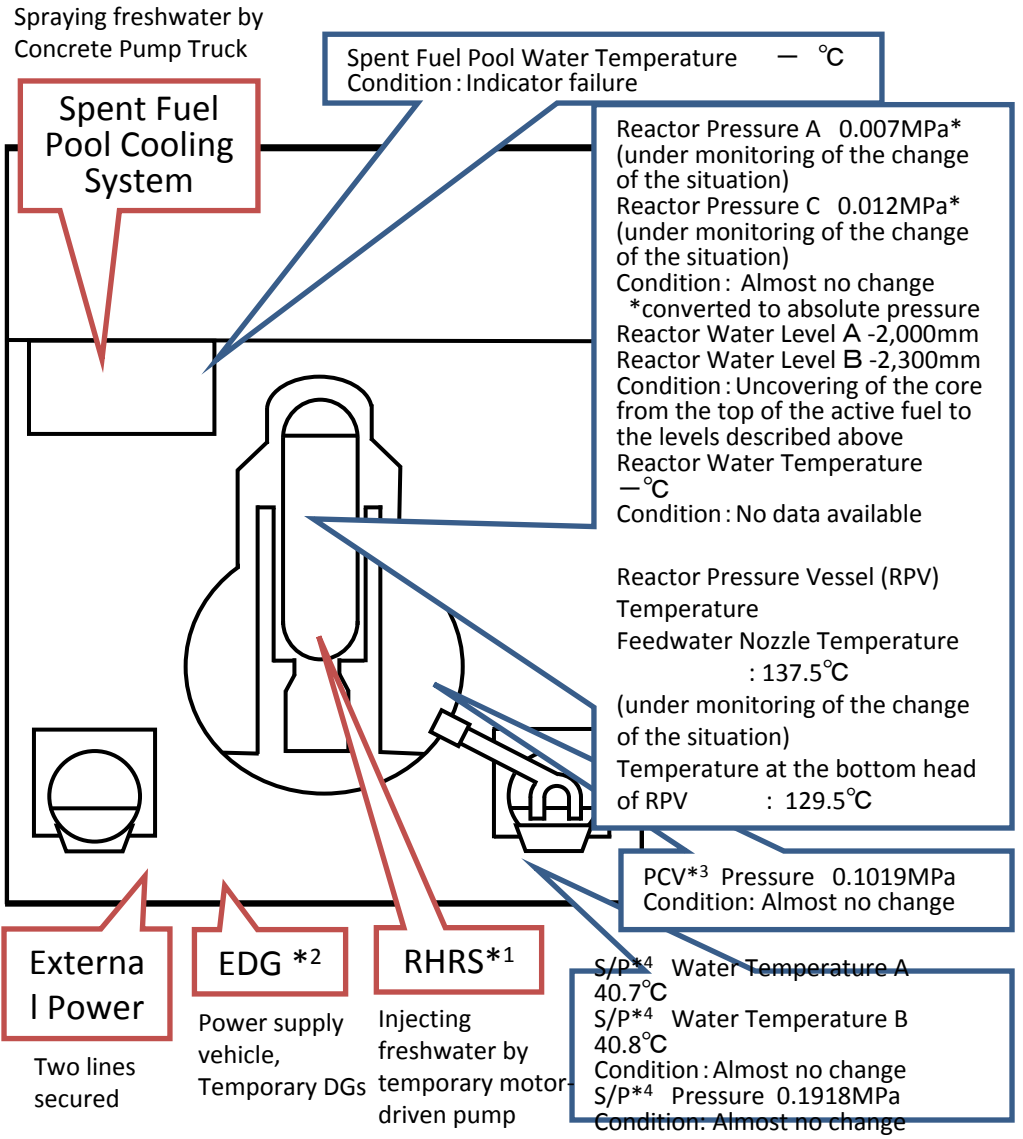
May 10th 9:01 ～May 12th 15:20 Suspended the transfer of stagnant water from the Turbine Building Trench of Unit 2 (Stagnant water with high-level radioactivity) to the Radioactive Waste Treatment Facility in order to lay the water transfer pipes from the Turbine Building of Unit 3 to the Radioactive Waste Treatment Facility.

May 10th 13:09～14:45 Injected freshwater to SFP via FPC using the temporary motor-driven pump.(13:19～14:35 Hydrazine was also injected)

May 11th 8:47～15:55 Due to the restoration of the Okuma No.2 transmission line, the power supply for the pump for injecting water into the reactor was temporarily switched to the temporary diesel generator. (After the restoration, the power supply is partially received from this line.)

May 14th 13:00～14:37 Injected freshwater to SFP via FPC using the temporary motor-driven pump.(13:08～14:02 Hydrazine was also injected)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 3
（As of 6:00 May 17, 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)

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

Major Events after the Earthquake 1/2

March 11th 14:46 Under operation, Automatic shutdown by the earthquake
March 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
March 13th 05:10 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
March 13th 08:41 Started to vent.
March 13th 13:12 Started to inject seawater and borated water to the Reactor Core.
March 14th 05:20 Started to vent.
March 14th 07:44 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
March 14th 11:01 Sound of explosion
March 16th around 08:30 White smoke generated.
March 17th 09:48～10:01 Water discharge by the helicopters of Self-Defense Force
March 17th 19:05～19:15 Water spray from the ground by High pressure water-cannon trucks of Police
March 17th 19:35～20:09 Water spray from the ground by fire engines of Self-Defense Force
March 18th before 14:00～14:38 Water spray from the ground by 6 fire engines of Self-Defense Force
March 18th ～14:45 Water spray from the ground by a fire engine of the US Military
March 19th 00:30 ～01:10 Water spray by Hyper Rescue Unit of Tokyo Fire Department
March 19th 14:10 ～ 20th 03:40 Water spray by Hyper Rescue Unit of Tokyo Fire Department
March 20th 11:00 Pressure of PCV rose(320kPa).Afterward fell.
March 20th 21:36 ～ 21st 03:58 Water spray by Hyper Rescue Unit of Tokyo Fire Department
March 21st around 15:55 Grayish smoke generated and was confirmed to be died down at 17:55.
March 22nd 15:10 ～16:00 Water spray by Hyper Rescue Unit of Tokyo Fire Department and Osaka City Fire Bureau.
March 22nd 22:46 Lighting in the Central Control Room was recovered.
March 23rd 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 23rd around 16:20 Black smoke generated and was confirmed to died down at around 23:30 and 24th 04:50.
March 24th 05:35～16:05 Injection of around 120 ton of sea water to SFP via FPC
March 25th 13:28～16:00 Water spray by Kawasaki City Fire Bureau supported by Tokyo Fire Department
March 25th 18:02 Started fresh water injection to the core.
March 27th 12:34～14:36 Water spray by Concrete Pump Truck
March 28th 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 28th 20:30 Switched to the water injection to the core using a temporary motor-driven pump.
April 3rd 12:18 The power supply to the temporary motor-driven pump was switched from the temporary power supply to the external power supply.
April 11th around 17:16 Loss of external power supply of Unit 1 and 2 due to an earthquake occurred (at Hamadori in Fukushima Prefecture) and water injection to the Reactor Core was suspended.
April 11th 18:04 External power supply of Units 1 and 2 recovered (April 11th 17:56). Resumed injecting water to the Reactor Core.
April 17th 11:30～14:00 Confirmed the situation in the reactor building using unmanned robot.
April 18th 12:38～13:05 Stopped the water injection into the reactor core to replace the current hose with a new one
April 19th 10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.
April 22nd 13:40～14:00 Tentatively Injected freshwater to SFP via the Fuel Pool Coolant Purification Line.
April 25th 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 30th 11:34 Completed reinforcement work of the power supply both Units 3, 4). (Increasing the voltage from 6.6kv to 66kv)

Major Events after the Earthquake 2/2

May 2nd 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 8th 12:10 ～14:10 Injected freshwater to SFP via FPC using the temporary motor-driven pump.

May 8th 16:18 Started to transfer of water in the Condenser to the underground of the Turbine Building in order to carry out piping work of Reactor Feedwater System.

May 9th 12:14 ～15:00 Injected freshwater to SFP via FPC using the temporary motor-driven pump. (12:39 ～14:36 Hydrazine was also injected)

May 11th 8:47～15:55 Due to the restoration of the Okuma No.2 transmission line, the power supply for the pump for injecting water into the reactor was temporarily switched to the temporary diesel generator.

May 11th 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 12th 16:53 In addition to the plumbing pro-fire extinguishing, started core flooding from the plumbing pro-water supply.

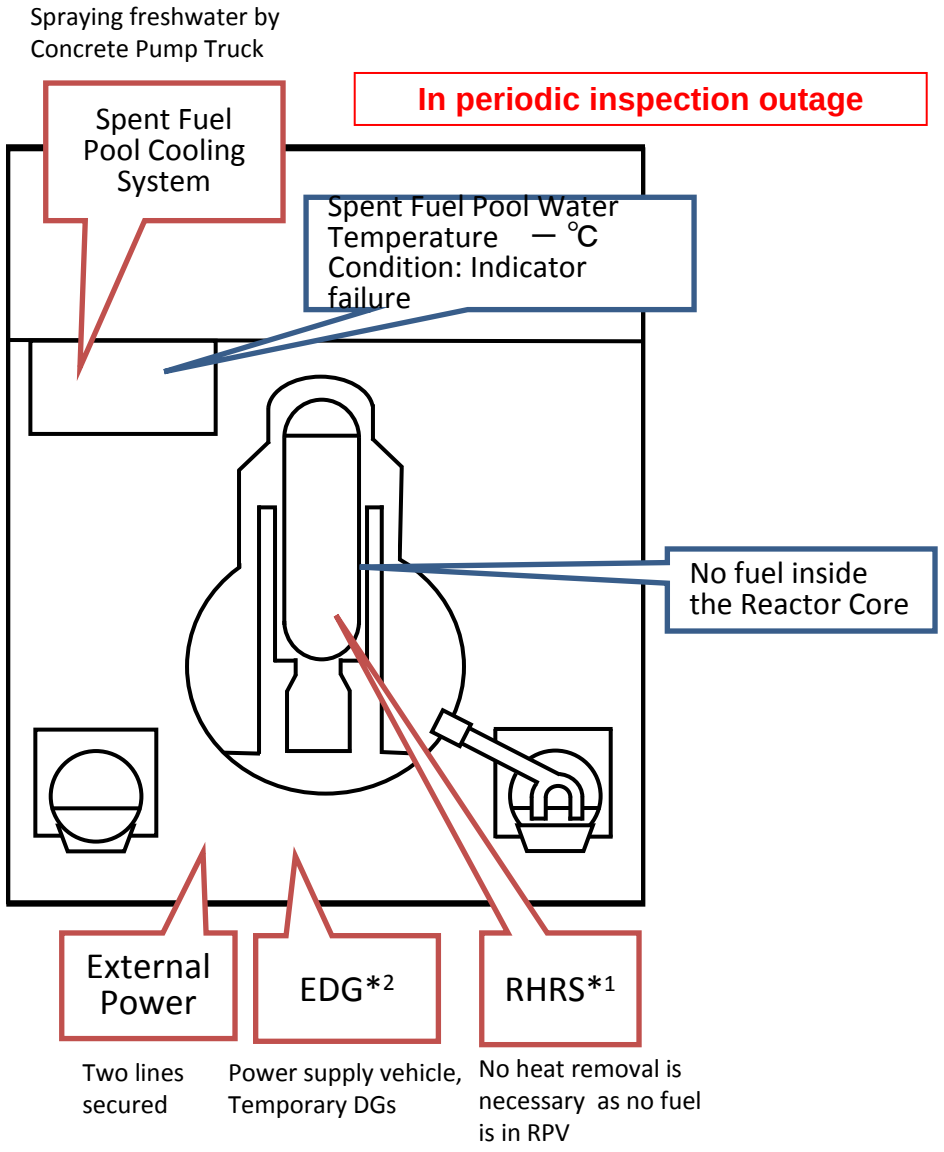
May 15th 14:33～17:00 Injected borated water to the Reactor Core.

May 16th 15:00～18:32 Injected freshwater to SFP via FPC using the temporary motor-driven pump. (15:10 ～17:30 Hydrazine was also injected)

<Water spray by Concrete Pump Truck (Fresh water)>

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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4
（As of 6:00 May 17, 2011）



*1 Residual Heat Removal System

*2 Emergency Diesel Generator

*3 Reactor Pressure Vessel

Major Events after the Earthquake

In periodic inspection outage when the earthquake occurred
March 14th 04:08 Water temperature in the Spent Fuel Pool (SFP), 84℃
March 15th 06:14 Confirmed the partial damage of wall in the 4th floor.
March 15th 09:38 Fire occurred in the 3rd floor. (12:25 extinguished)
March 16th 05:45 Fire occurred. TEPCO couldn't confirm any fire on the ground. (06:15)
March 20th 08:21～09:40 Water spray over SFP by Self-Defense Force
March 20th around 18:30～19:46 Water spray over SFP by Self-Defense Force
March 21st 06:37～08:41 Water spray over SFP by Self-Defense Force
March 21st around 15:00 Work for laying cable to Power Center was completed.
March 22nd 10:35 Power Center received electricity.
<Water spray by Concrete Pump Truck (Seawater)>
March 22nd 17:17～20:32, March 23rd 10:00～13:02, March 24th 14:36～17:30, March 25th 19:05～22:07, March 27th 16:55～19:25

March 25th 06:05～10:20 Sea water injection to SFP via the Fuel Pool Cooling Line (FPC)
March 29th 11:50 Lighting in the Central Control Room was recovered.
April 11th around 17:16 An earthquake occurred (at Hamadori in Fukushima Prefecture).
April 12th 12:00～13:04 Sampled the water in SFP.
April 19th 10:23 Completed the work of strengthening connection of the power supplies between Units 1-2 and Units 3-4.
April 22nd Measured the water level of SFP by a gauge hung on Concrete Pump Truck (62m class).
April 30th 11:34 Completed reinforcement work of the power supply both Units 3, 4. (Increasing the voltage from 6.6kv to 66kv)
May 9th Started installation work of the supporting structure for the floor of SFP

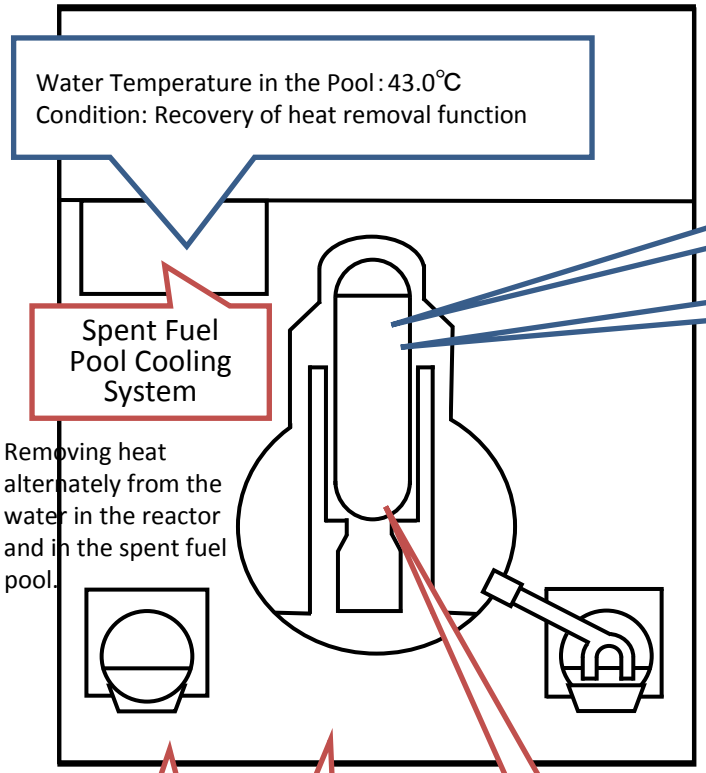
< Water spray by Concrete Pump Truck (Fresh water)>
March 30th 14:04～18:33, April 1st 08:28～14:14, April 3rd 17:14～22:16, April 5th 17:35～18:22, April 7th 18:23～19:40, April 9th 17:07～19:24, April 13th 0:30～6:57, April 15th 14:30～18:29, April 17th 17:39～21:22, April 19th 10:17～11:35, April 20th 17:08～20:31, April 21st 17:14～21:20, April 22nd 17:52～23:53, April 23rd 12:30～16:44, April 24th 12:25～17:07, April 25th 18:15～April 26th 0:26, April 26th 16:50～20:35, April 27th 12:18～15:15, May 5th 12:29～20:46, May 6th 12:38～17:51, May 7th 14:05～17:30 , May 9th 16:05～19:05 (16:11 ～18:38 Hydrazine was also injected) ,May 11th 16:07～19:38 (16:14 ～19:36 Hydrazine was also injected), May 13th 16:04～19:04 (16:20 ～18:41 Hydrazine was also injected), May 15th 16:25～20:25 (16:26 ～18:30 Hydrazine was also injected)

Current Conditions：No fuel is in RPV*3.
Fresh water is being injected to the Spent Fuel Pool.

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 5
（As of 6:00 May 17, 2011）

In periodic inspection outage



Water Temperature in the Pool：43.0℃
Condition: Recovery of heat removal function

Reactor Pressure：0.108MPa*
Reactor Water Level：1,936mm
Reactor Water Temperature： 46.9℃
Condition：Pressure is under control.
*converted to absolute pressure

Reactor Pressure Vessel Temperature:
Monitoring by Reactor Water Temperature

Spent Fuel Pool Cooling System

Removing heat alternately from the water in the reactor and in the spent fuel pool.

External Power

One line secured

EDG*2

Share two EDGs of Unit 6

RHRS*1

Removing heat alternately from the water in the reactor and in the spent fuel pool.

Major Events after the Earthquake：

March 20th 14:30 Cold shutdown

March 21st 11:36 Receiving electricity from external power supply

March 23rd 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 24th 16:14 Repair of the RHRS pump was completed.

March 24th 16:35 Started to cooling.

April 4th 21:00 – 8th 12:14 Discharged the groundwater with low-level radioactivity in the Sub Drain Pit to the sea (around 950 ton).

April 25th 12:22 ～16:43 For reinforcement work of the power supply, the pump for Residual Heat Removal (RHR) was temporarily stopped.

April 25th 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.

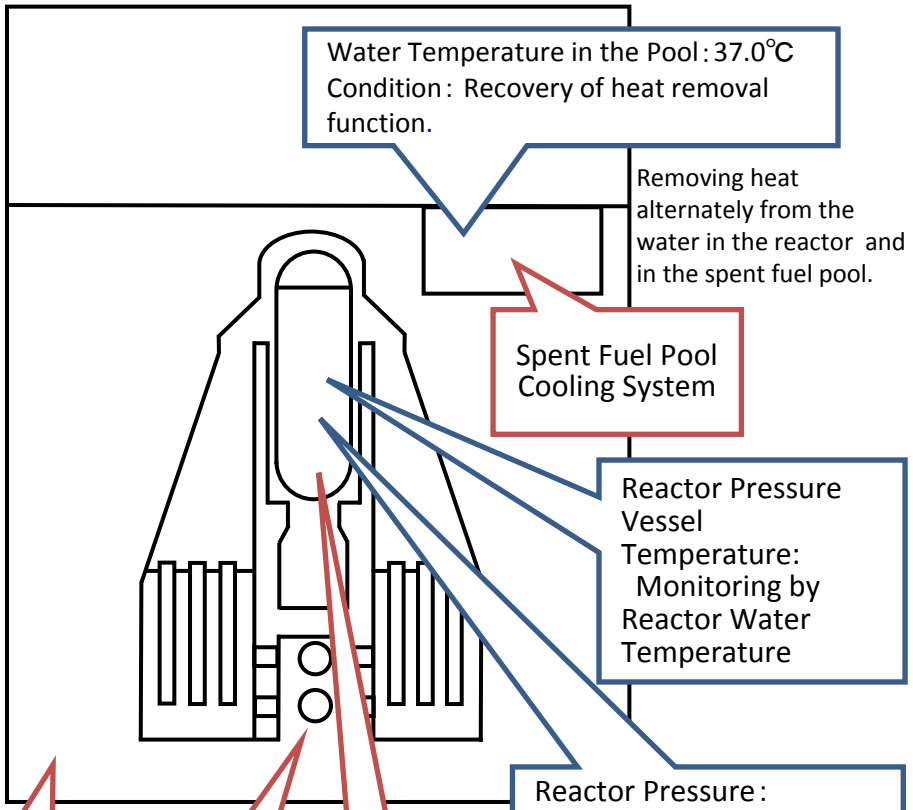
*1 Residual Heat Removal System

*2 Emergency Diesel Generator

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 6
（As of 6:00 May 17, 2011）

In periodic inspection outage



*1 Residual Heat Removal System
*2 Emergency Diesel Generator

Major Events after the Earthquake

March 20th 19:27 Cold shutdown
March 22nd 19:17 Receiving electricity from external power supply
April 4th 21:00 – 9th 18:52 Discharged the groundwater with low-level radioactivity in the Sub Drain Pit to the sea (around 373 ton).
April 19th 11:00～15:00 Transferred stagnant water under the base of the turbine building to the condenser for measuring the amount of it.
April 20th 9:51～15:56 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 25th 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 11:03 ～14:53 The pump for RHR was temporarily shut off in order to test the Start-up Transformer for power reception.

〈Transferred stagnant water on the basement floor of the turbine building to the temporary tank〉.
May 1st 14:00 ～17:00 , May 2nd 10:00 ～ 16:00 , May 3rd 14:00 ～17:00 , May 6th 14:00 ～ 17:00 , May 7th 10:00 ～ 15:00 , May 9th 14:00 ～ 17:00, May 10th 10:00 ～ 16:00 , May 11th 10:00 ～ 16:00 , May 12th 10:00 ～16:00, May 13th 10:00 ～ 15:00 , May 14th 10:00 ～ 15:00 , May 15th 10:00 ～15:00, May 16th 10:00 ～ 14:00

〈Transferred stagnant water on the basement floor of the reactor building to the Radioactive Waste Treatment 〉
May 10th 11:00 ～ 12:30 , May 11th 11:00 ～ 12:30 , May 12th 10:30～12:30, May 13th 11:30 ～12:15

(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)