

April 12, 2011

Nuclear and Industrial Safety Agency

Seismic Damage Information (the 88th Release)
(As of 08:00 April 12th, 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

- Due to the occurrence of earthquake, the external power supply for Units 1 and 2 was lost, the fresh water injection to the Reactor Pressure Vessel (RPV) of Units 1, 2 and 3 was suspended, and the nitrogen injection to the Primary Containment Vessel (PCV) of Unit 1 was suspended. (17:16 April 11th)
- The external power supply of Units 1 and 2 was recovered. (17:56 April 11th)
- Fresh water injection to RPV of Units 1, 2 and 3 was resumed. (18:04 April 11th)
- The nitrogen injection to PCV of Unit 1 was started. (23:34 April 11th)
- The test scattering of antiscattering agent to prevent the radioactive materials on the ground surface from being scattered was carried out in the area of about 1,200 m² on the mountain-side of the Common Pool. (From 12:00 till 13:00 April 11th)
- It was confirmed that a fire occurred at the Building for Water Discharge Canal Sampling nearby Unit 4. (Around 6:38 April 12th) It was confirmed that there is no fire and smoke as a result of the initial fire fighting. (Before 07:00 on the same day)

2. Exposure of Workers

The 3 out of 21 workers conducting operations on Fukushima Dai-ichi NPS, who were at the level of exposure more than 100mSv, had the second medical examination at the National Institute of Radiological Sciences on 11 April, as a result, there was no problem regarding the condition of their health. The 2 workers who had been partially exposed to radiation on their skin of both legs were judged that any conditions of burn or red spots were not found on their skin.

For more information:

NISA English Home Page

<http://www.nisa.meti.go.jp/english/index.html>

April 12, 2011

INES (the International Nuclear and Radiological Event Scale) Rating on
the Events in Fukushima Dai-ichi Nuclear Power Station
by the Tohoku District - off the Pacific Ocean Earthquake

The Rating of the International Nuclear and Radiological Event Scale (INES) on the events in Fukushima Dai-ichi Nuclear Power Station (NPS), Tokyo Electric Power Co. Inc. (TEPCO), caused by the Tohoku District - off the Pacific Ocean Earthquake is temporarily assessed as Level 7, considering information obtained after March 18th.

However, the amount of discharged radioactive materials is approximately 10 percent of the Chernobyl accident which was assessed on the same level.

1. INES

INES is the rating, which International Atomic Energy Agency (IAEA) and Nuclear Energy Agency, Organization for Economic Cooperation and Development (OECD/NEA) established and proposed to the Member States in March 1992, in order to indicate the impact on safety by the individual event in a nuclear facility and so on. Japan has also utilized it since 1 August 1992.

2. Events in Fukushima Dai-ichi NPS, TEPCO, by the Tohoku District - off the Pacific Ocean Earthquake

On 18 March, the ratings of the events in Fukushima Dai-ichi NPS by the Tohoku District - off the Pacific Ocean Earthquake were informed to be temporarily assessed as Level 5, considering information obtained before March 18th. However, Nuclear and Industrial Safety Agency (NISA) estimated the total amount of discharged radioactive materials from the reactors of Fukushima Dai-ichi NPS to the air, making a trial

calculation using the result of analysis of the situation of the reactors and so on, which was carried out by Japan Nuclear Energy Safety Organization (JNES). This estimation resulted in the value corresponding to Level 7 of INES rating*, as listed in the following table..

* The value representing radiation impact, which is converted to the amount equivalent to ¹³¹I (Iodine), exceeds several tens of thousands of tera-becquerel (of the order of magnitude as 10¹⁶ Bq).

In addition, Nuclear Safety Commission of Japan (NSC) also estimated and announced the result of the trial calculation in the current stage regarding the total amount of discharged radioactive materials to the air, which had been being carried out in the Commission. This trial calculation is counted backward from the results of monitoring data of ¹³¹I and ¹³⁷Cs (Caesium) as the total amount of the discharge from the Fukushima Dai-ichi NPS, This results in the value corresponding to Level 7 of INES rating as well.

	Assumed amount of the discharge from Fukushima Dai-ichi NPS		(Reference) Amount of the discharge from the Chernobyl accident
	Estimated by NISA	Announced by NSC	
¹³¹ I ... (a)	1.3×10 ¹⁷ Bq	1.5×10 ¹⁷ Bq	1.8×10 ¹⁸ Bq
¹³⁷ Cs	6.1×10 ¹⁵ Bq	1.2×10 ¹⁶ Bq	8.5×10 ¹⁶ Bq
(Converted value to ¹³¹ I) ... (b)	2.4×10 ¹⁷ Bq	4.8×10 ¹⁷ Bq	3.4×10 ¹⁸ Bq
(a) + (b)	3.7×10 ¹⁷ Bq	6.3×10 ¹⁷ Bq	5.2×10 ¹⁸ Bq

(Notes) The conversion of the values to be equivalent to radiation impact of ¹³¹I regarding the NISA's estimation and the NSC's

announcement were carried out by NISA in accordance with the INES User's Manual.

Although Level 7 is the highest level of INES rating, it is estimated that the amount of discharged radioactive materials to the environment in the current stage is approximately 10 percent of the Chernobyl accident, which was assessed on the same level in the past.

3. Procedures to be taken

This information is about the result of the total amount of the discharge from Fukushima Dai-ichi NPS in the current stage. As radioactive materials are being released to the environment, NISA will continuously gather and evaluate information.

In addition, the official level of INES will be determined, considering the technical evaluation from specialist view points made by INES Evaluation Subcommittee (Chairman: Dr. Naoto Sekimura, Professor of University of Tokyo, Nuclear Professional School Engineering, Department of Nuclear Engineering and Management), which set up in the Nuclear and Industrial Safety Subcommittee of the Advisory Committee for Natural Resources and Energy, after the recurrence prevention measures are confirmed based on the concrete causes found.

(Contact Person)

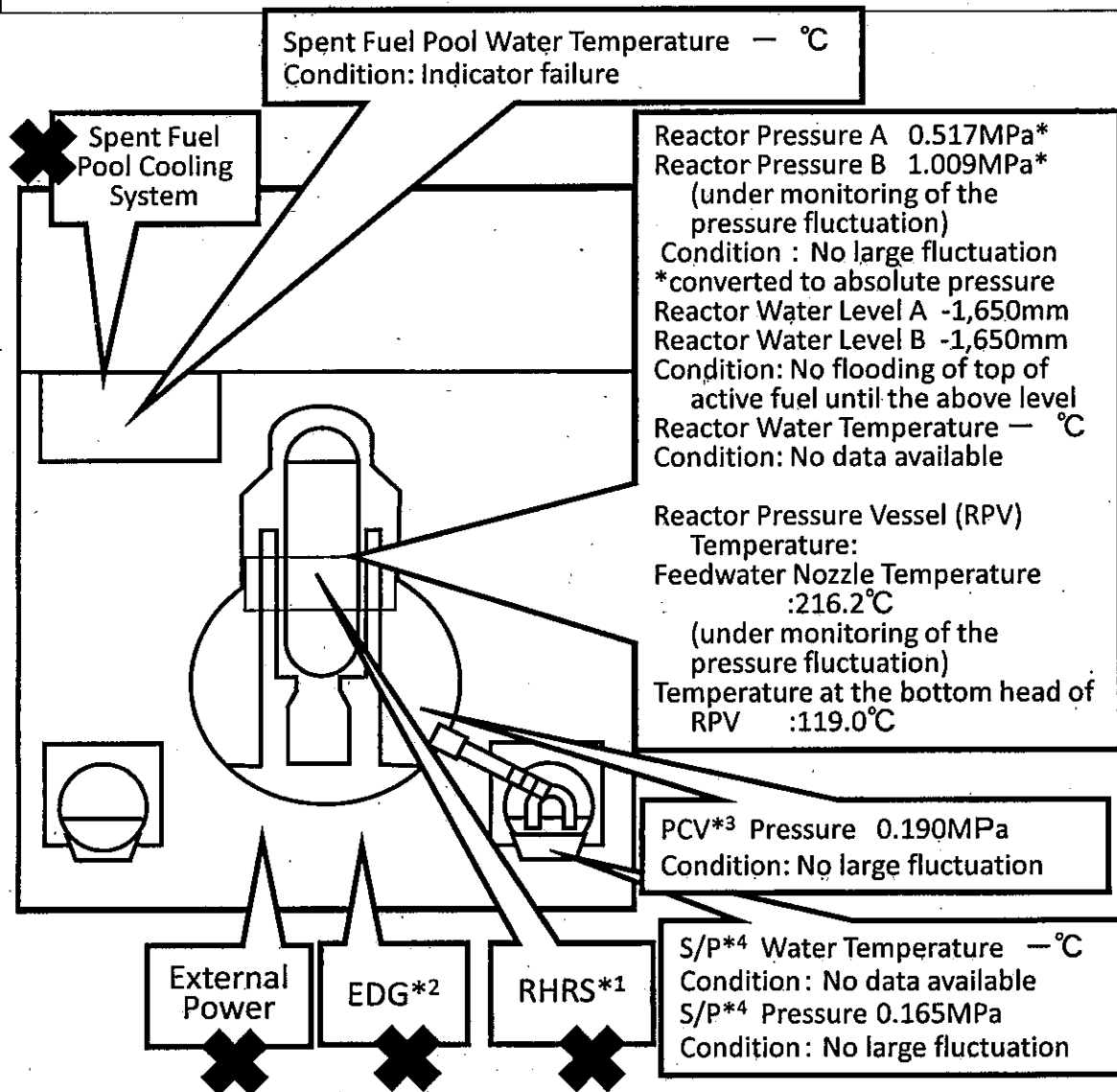
Mr. Toshihiro Bannai

Director, International Affairs Office,
NISA/METI

Phone: +81-(0)3-3501-1087

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 1 (As of 7:00 April 12th, 2011)

Major Events after the earthquake



- 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. (2m³/h →18m³/h)
- 09:00 Switched to the Feedwater Line only.(18m³/h →11m³/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 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.

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

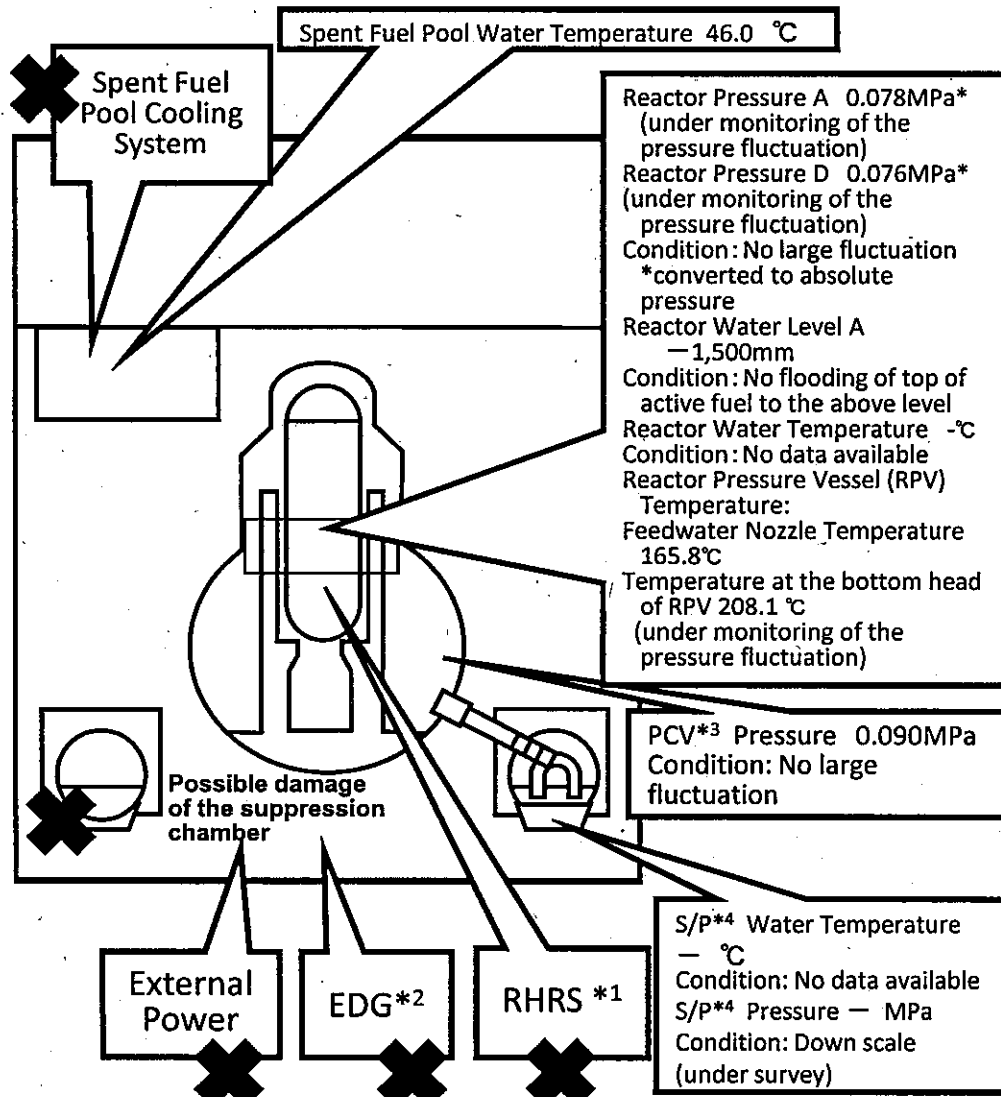
Current Conditions : Fresh water is being injected to the Spent Fuel Pool and the Reactor Core

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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 2

(As of 7:00 April 12th, 2011)

Major Events after the earthquake



- 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 Injection of fresh water from FPC to SFP 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 Condensate Storage Tank (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 Injection of fresh water from FPC to SFP 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 (Around 36 ton)
- 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 (Around 60 ton).
- April 11th around 17:16 Loss of external power supply due to an earthquake occurred. 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.

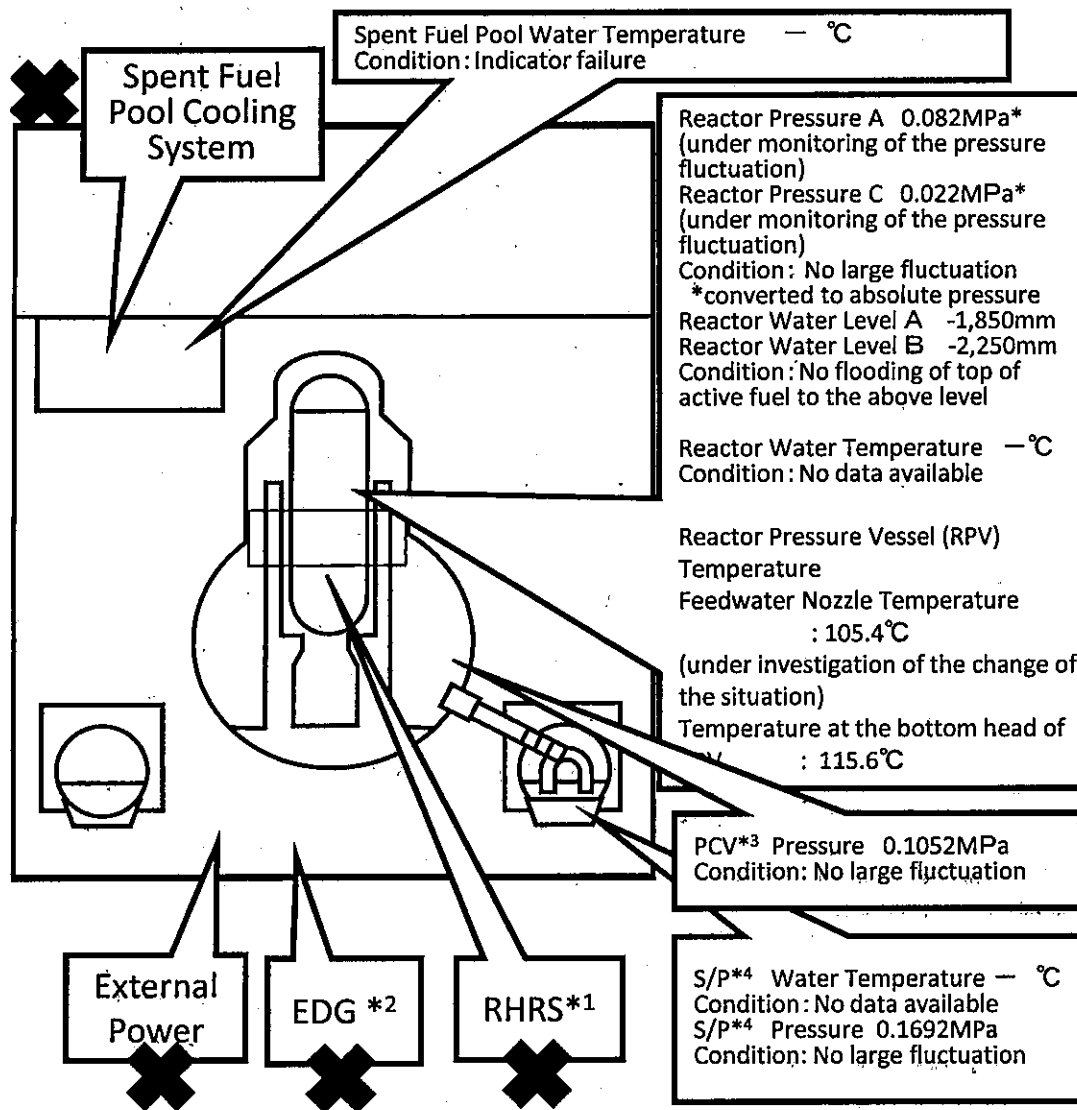
*1 Residual Heat Removal System
 *2 Emergency Diesel Generator
 *3 Primary Containment Vessel
 *4 Suppression Pool

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

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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 7:00 April 12th, 2011)

Major Events after the earthquake



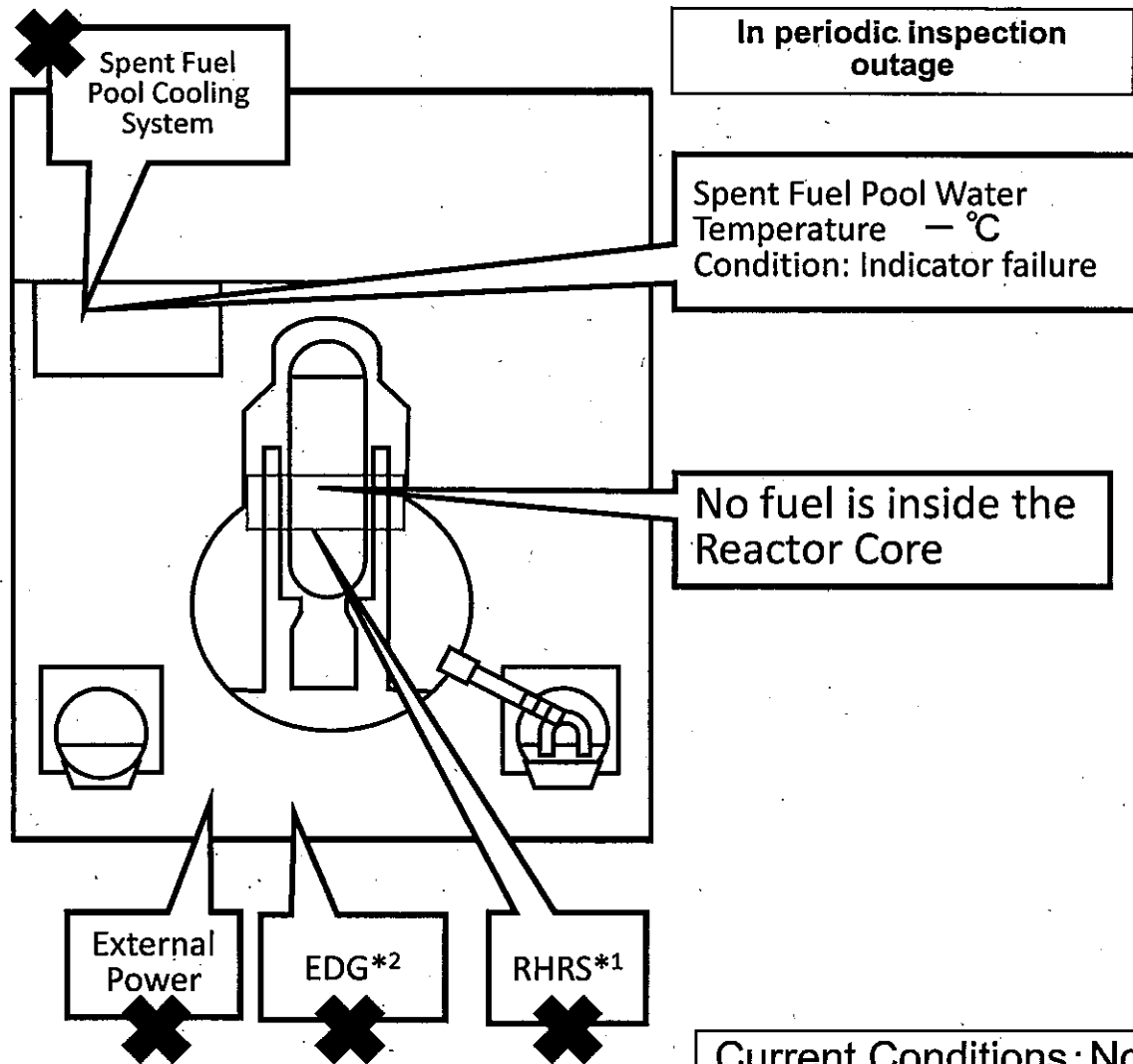
- *1 Residual Heat Removal System
- *2 Emergency Diesel Generator
- *3 Primary Containment Vessel
- *4 Suppression Pool

(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

- 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 occurred and water injection to the Reactor Core was suspended.
- April 11th 18:04 External power supply of Unit 1 and 2 recovered (April 11th 17:56). Resumed injecting water to the Reactor Core.
- <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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4 (As of 7:00 April 12th, 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°C
- 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.

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

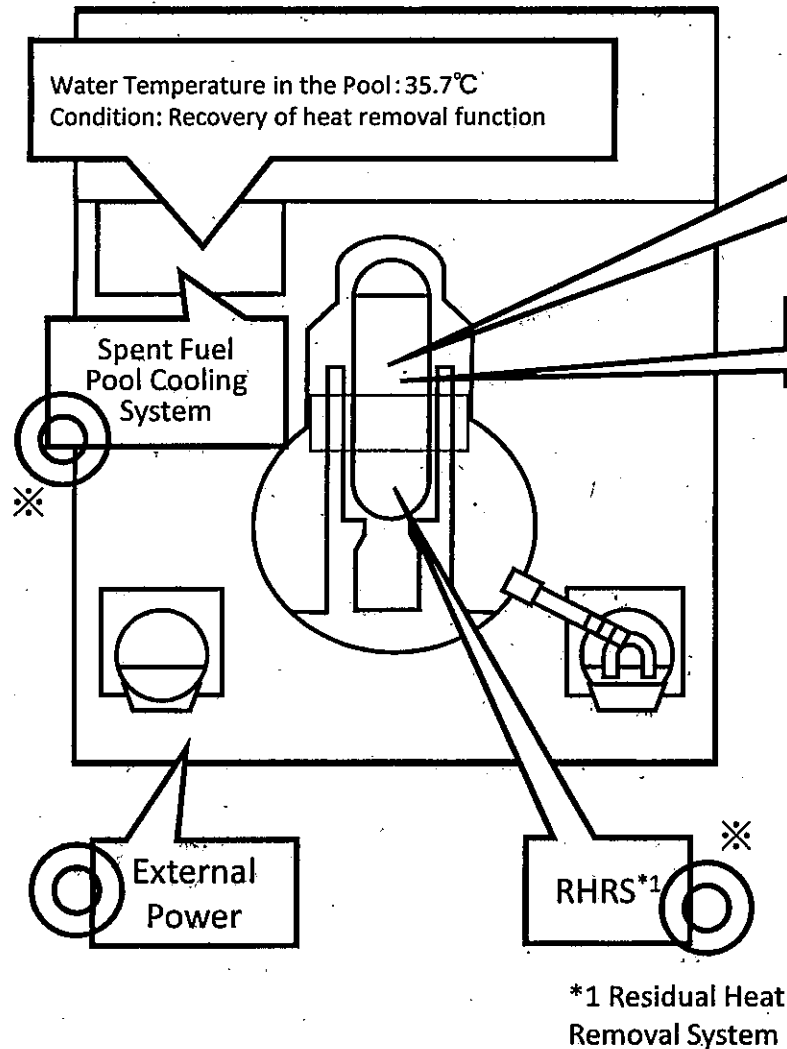
- 30th 14:04~18:33, 1st 08:28~14:14, 3rd 17:14~22:16, 5th 17:35~18:22, 7th 18:23~19:40, 9th 17:07~19:24

**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 7:00 April 12th, 2011)

In periodic inspection outage



Reactor Pressure: 0.103MPa*
 Reactor Water Level: 1,751mm
 Reactor Water Temperature: 33.1°C
 Condition: Pressure is under control,
 *converted to absolute pressure

Reactor Pressure Vessel Temperature:
 Monitoring by Reactor Water Temperature

※Heat removal was carried out alternately with the water in the Reactor Core and in the Spent Fuel Pool.

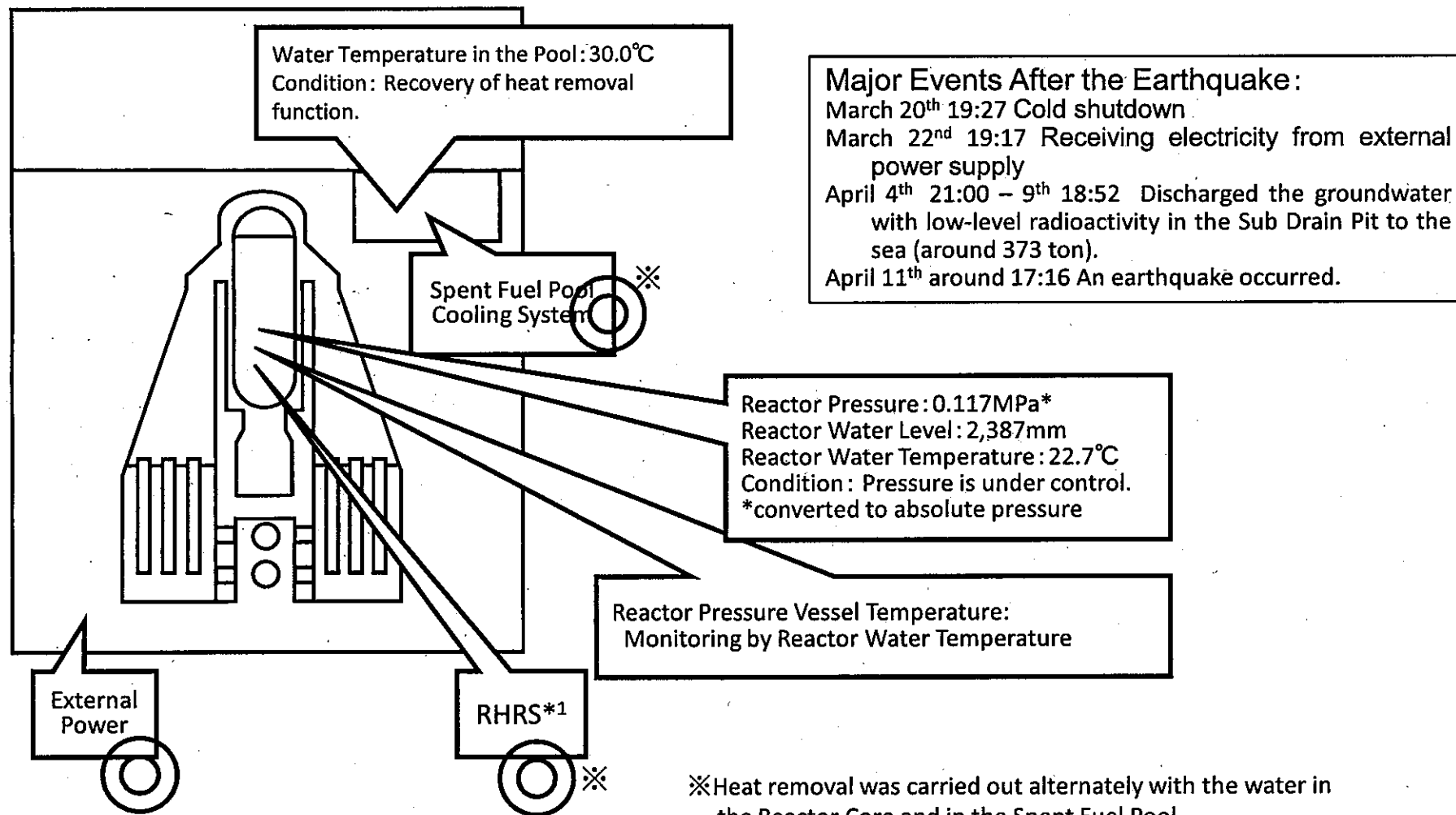
Major Events After the Earthquake:

- 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 11th around 17:16 An earthquake occurred.

*1 Residual Heat Removal System

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 6 (As of 7:00 April 12th, 2011)

In periodic inspection outage



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 11th around 17:16 An earthquake occurred.

*1 Residual Heat Removal System

※Heat removal was carried out alternately with the water in the Reactor Core and in the Spent Fuel Pool.