

April 1, 2011

Nuclear and Industrial Safety Agency

Seismic Damage Information (the 66th Release)
(As of 09:30 April 1st, 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

- Spray of around 90t of fresh water over the Spent Fuel Pool of Unit 1 using Concrete Pump Truck was carried out. (From 13:03 till 16:04 March 31st)
- Spray of around 105t of fresh water over the Spent Fuel Pool of Unit 3 using Concrete Pump Truck (50t/h) was carried out. (From 16:30 till 19:33 March 31st)
- Spray of water over the Spent Fuel Pool of Unit 4 using Concrete Pump Truck (50t/h) started. (08:25 April 1st)
- A barge of the US armed forces carrying fresh water for cooling reactors, etc. landed in the exclusive port of the power station, being towed by the ships of Maritime Self-Defense Force. (15:42 March 31st)

● Fukushima Dai-ni NPS

- A propaganda vehicle entered the premises through the Western Gate for Cars which was controlled by locking. (13:08 March 31st) After traveling in the premises, it went away through the same gate. (13:20 March 31st) This was notified to the Fukushima Prefectural Police. After the propaganda vehicle went away, the gate was blockaded by a vehicle of TEPCO.

2. Action taken by NISA

- Regarding the break-in of the propaganda vehicle to Fukushima Dai-ni NPS on 31 March, NISA directed TEPCO orally to take the carefully thought-out measures regarding physical protection, etc..
- NISA alerted TEPCO to taking the carefully thought-out measures regarding radiation control for workers.
- NISA strictly alerted TEPCO to taking appropriate measures regarding the mistake in the result of nuclide analysis.

< Exposure of workers >

As for the workers conducting operations in Fukushima Dai-ichi NPS, the total number of people who were at the level of exposure more than 100mSv becomes 21.

For more information:

NISA English Home Page

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

Fukushima Di-ichi Nuclear Power Station Major Parameters of the Plant (As of 6:00, April 1st)

Unit No.	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6
Situation of water injection	Injecting fresh water via the Water Supply Line. Flow rate of injected water : 133 ℓ/min (As of 8:32, March 29th) temporary measuring instrument	Injecting fresh water via the Fire Extinguish Line. Flow rate of injected water :150 ℓ/min (As of 14:00, March 30th) temporary measuring instrument	Injecting fresh water via the Fire Extinguish Line. Flow rate of injected water: 116 ℓ/min (As of 14:39, March 29th) temporary measuring instrument	Under shutdown	Under shutdown	Under shutdown
Reactor water level	Fuel range A : -1,600mm Fuel range B : -1,600mm (As of 6:00, April 1st)	Fuel range A : -1,500mm (As of 6:00, April 1st)	Fuel range A:-1,900mm Fuel range B:-2,250mm (As of 5:45, April 1st)	#2	Shutdown range measurement 1,912mm (As of 6:00, April 1st)	Shutdown range measurement 1,699mm (As of 6:00, April 1st)
Reactor pressure	0.293MPa g(A) 0.495MPa g(B) (As of 6:00, April 1st)	-0.014MPa g (A) -0.016MPa g (B) (As of 6:00, April 1st)	0.018MPa g (A) -0.086MPa g (C) (As of 5:45, April 1st)	#2	0.007MPa g (As of 6:00, April 1st)	0.003MPa g (As of 6:00, April 1st)
Reactor water temperature	(Impossible collection due to low system flow rate)			#2	29.8°C (As of 6:00, April 1st)	44.1°C (As of 6:00, April 1st)
Reactor Pressure Vessel (RPV) temperature	Feedwater nozzle temperature: 255.2°C Temperature at the bottom head of RPV: 119.7°C (As of 6:00, April 1st)	Feedwater nozzle temperature: 163.6°C Temperature at the bottom head of RPV: #1 (As of 6:00, April 1st)	Feedwater nozzle temperature: 92.6°C (under survey) Temperature at the bottom head of RPV: 116.3°C (As of 5:45, April 1st)	Unit 4 No heating element (fuel) inside the reactor Unit 5,6 Monitoring by the reactor water temperature		
D/W*1 Pressure, S/C*2 Pressure	D/W: 0.170MPa abs S/C: 0.170MPa abs (As of 6:00, April 1st)	D/W: 0.110MPa abs S/C: Down scale (under survey) (As of 6:00, April 1st)	D/W: 0.1071MPa abs S/C: 0.1755MPa abs (As of 5:45, April 1st)	#2		
CAMS*3	D/W: 4.43×10^1 Sv/h S/C: 1.74×10^1 Sv/h (As of 6:00, April 1st)	D/W: 3.72×10^1 Sv/h S/C: 1.11×10^0 Sv/h (As of 6:00, April 1st)	D/W: 2.45×10^1 Sv/h S/C: 1.00×10^0 Sv/h (As of 5:45, April 1st)	#2		
D/W*1 design operating pressure	0.384MPa g(0.485MPa abs)	0.384MPa g(0.485MPa abs)	0.384MPa g(0.485MPa abs)	#2		
D/W*1 maximum operating pressure	0.427MPa g(0.528MPa abs)	0.427MPa g(0.528MPa abs)	0.427MPa g(0.528MPa abs)	#2		
Spent Fuel Pool water	#1	48.0°C (As of 6:00, April 1st)	#1	#1	36.6°C (As of 6:00, April 1st)	22.0°C (As of 6:00, April 1st)
FPC skimmer level	4,500mm (As of 6:00, April 1st)	5,100mm (As of 6:00, April 1st)	#1	5,150mm (As of 5:45, April 1st)	#2	
Power supply	Receiving external power supply (P/C*4 2C)		Receiving external power supply (P/C4D)		Receiving external power supply	

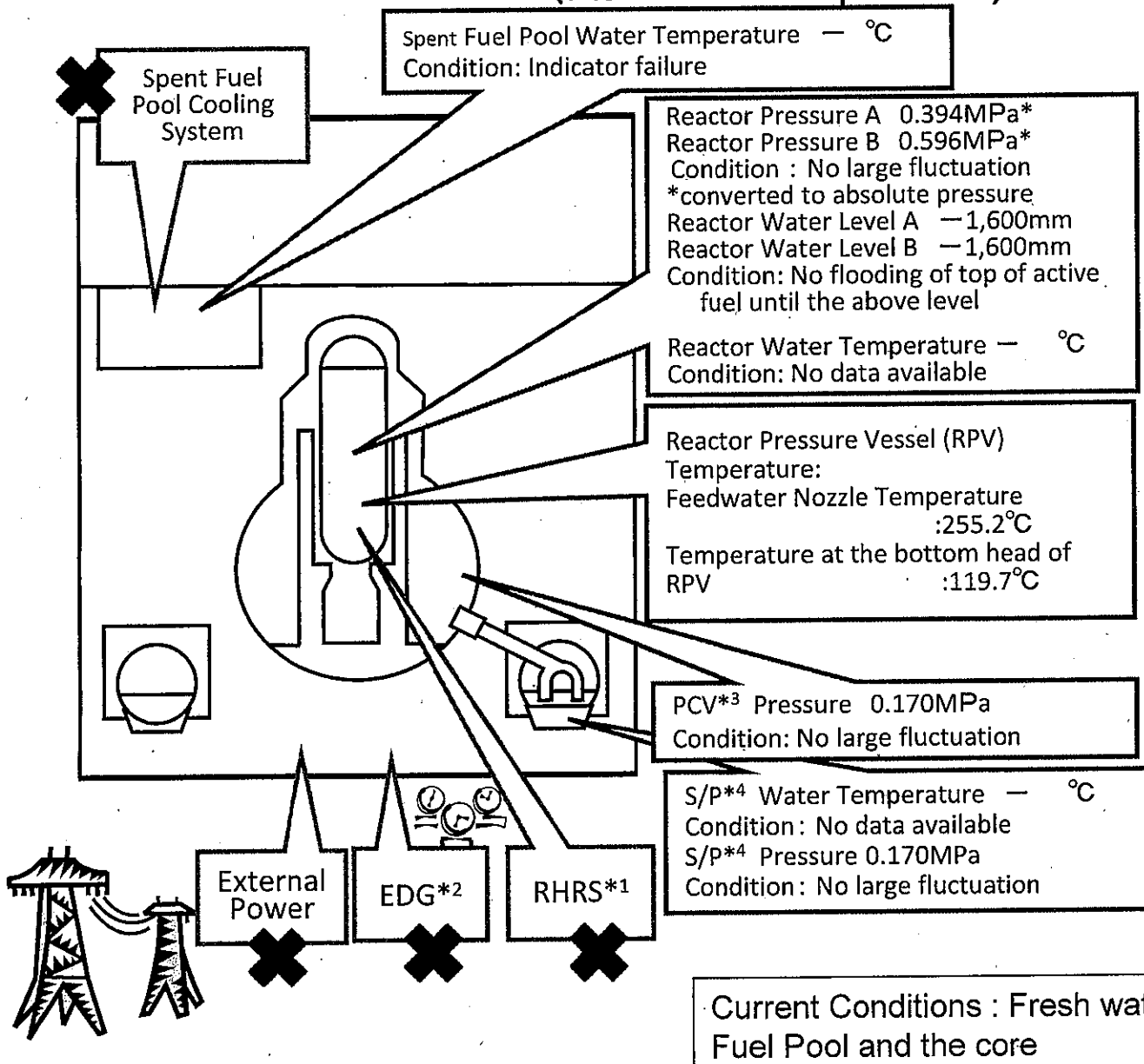
Other information	Unit3: Collecting the data of RPV temperature and continuing survey for transitional situation Unit2: Confirmed the indicated value of S/C Pressure but continuing to survey the transition of condition	Common pool: about 32 °C (As of 8:10, March 31th)	Unit5:SHC*5 mode (From 10:36 March 31th)	Unit6:Nonthermal mode (From 19:51 March 31th)
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Pressure conversion	$\text{Gauge pressure (MPa g)} = \text{Absolute pressure (MPa abs)} - \text{Atmospheric pressure (Normal atmospheric pressure 0.1013MPa)}$ $\text{Absolute pressure (MPa abs)} = \text{Gauge pressure (MPa g)} + \text{Atmospheric pressure (Normal atmospheric pressure 0.1013MPa)}$
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- *1 D/W : Dry Well
- *2 S/C : Suppression Chamber
- *3 CAMS : Containment Atmospheric Monitoring System
- *4 P/C : Power Center
- *5 SHC : Shutdown Cooling

- #1 : Measuring instrument malfunction
- #2 : Except from data collection

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



Major Events after the earthquake

- 11th 14:46 Under operation, Automatic shutdown by the earthquake
- 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
- 11th 16:36 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
- 12th 01:20 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
- 12th 10:17 Started to vent.
- 12th 15:36 Sound of explosion
- 12th 20:20 Started to inject seawater and borated water to core.
- 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)
- 23rd 09:00 Switched to the Feedwater Line only.(18m³/h →11m³/h).
- 24th 11:30 Lighting in the Central Control Room was recovered.
- 25th 15:37 Started fresh water injection.
- 29th 08:32 Switched to the water injection to the core using the temporary motor-driven pump.
- 31st 12:00 Started to transfer the stagnant water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
- 31st 13:03~16:04 Fresh water spray by Concrete Pump Truck (Fresh water)

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

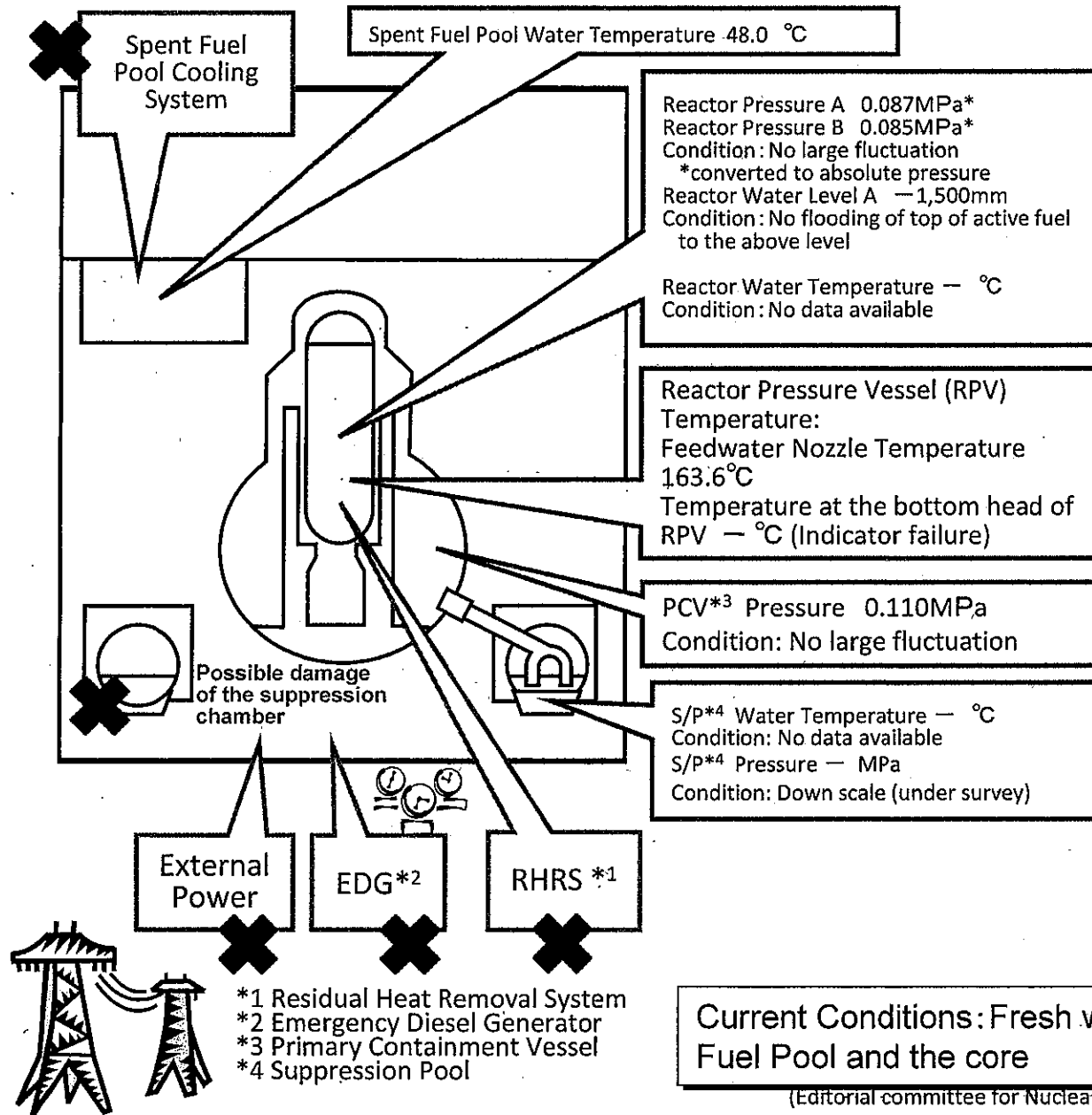
Current Conditions : Fresh water is being injected to the Spent Fuel Pool and the core

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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 2 (As of 6:00 April 1st, 2011)

Major Events after the earthquake

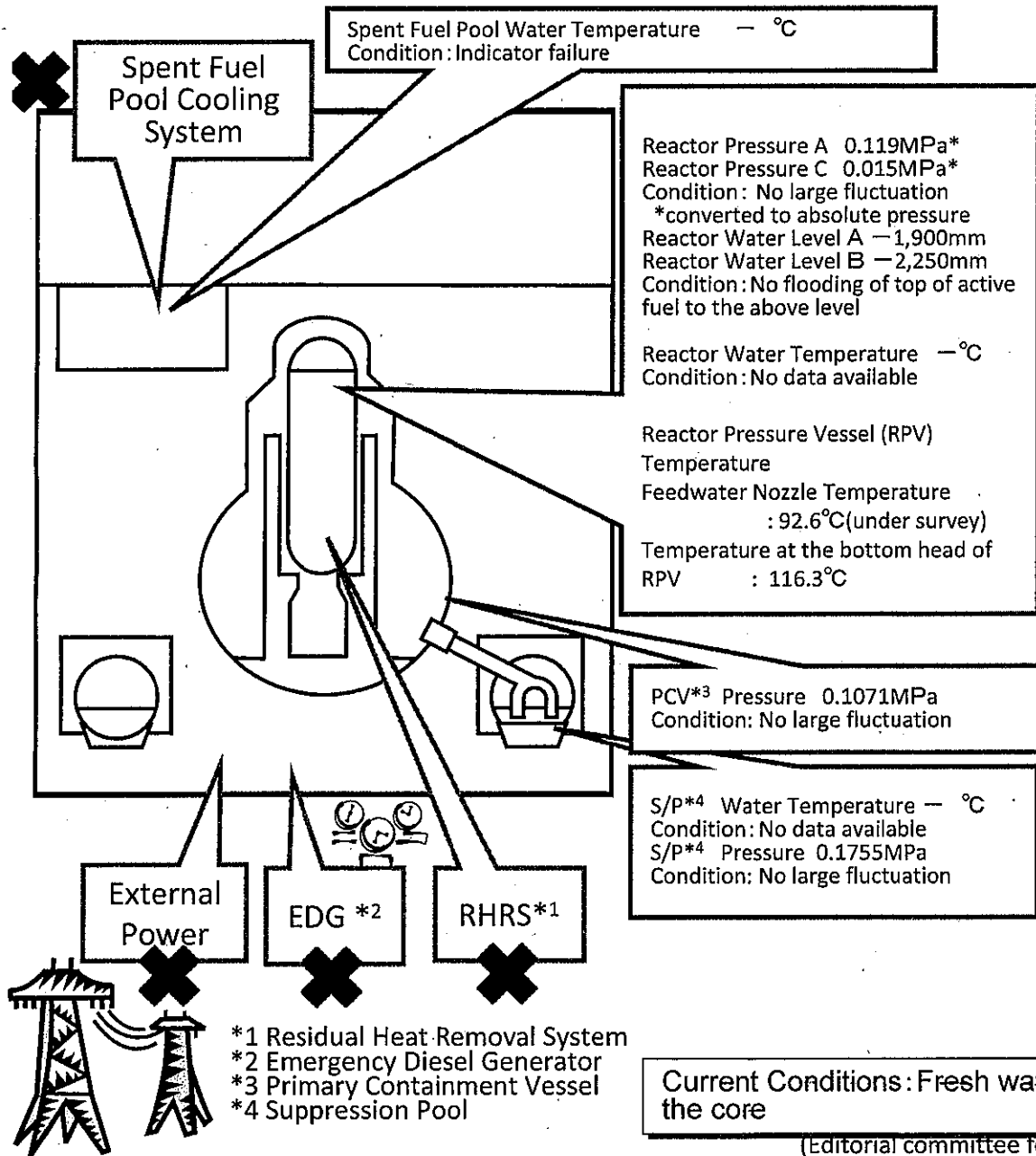
- 11th 14:46 Under operation, Automatic shutdown by the earthquake
- 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
- 11th 16:36 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
- 13th 11:00 Started to vent.
- 14th 13:25 Occurrence of the Article 15 event (Loss of reactor cooling functions)
- 14th 16:34 Started to inject water to the Reactor Core.
- 14th 22:50 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
- 15th 00:02 Started to vent.
- 15th 06:10 Sound of explosion
- 15th around 06:20 Possible damage of the suppression chamber
- 20th 15:05~17:20 Approximately 40 ton seawater injection to the Spent Fuel Pool (SFP) via the Fuel Pool Cooling Line (FPC)
- 20th 15:46 Power Center received electricity.
- 21st 18:22 White smoke generated. The smoke died down and almost invisible at 07:11 March 22nd.
- 22nd 16:07 Injection of around 18 tons of seawater to SFP
- 25th 10:30~12:19 Sea water injection to SFP via FPC
- 26th 10:10 Started to inject fresh water to the Reactor Core.
- 26th 16:46 Lighting in the Central Control Room was recovered.
- 27th 18:31 Switched to the water injection to the core using the temporary motor-driven pump.
- 29th 16:30~18:25 Switched to the temporary motor-driven pump injecting fresh water to SFP.
- 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)
- 31st 12:00 Started to transfer the stagnant water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)



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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 3 (As of 6:00 April 1st, 2011)

Major Events after the earthquake

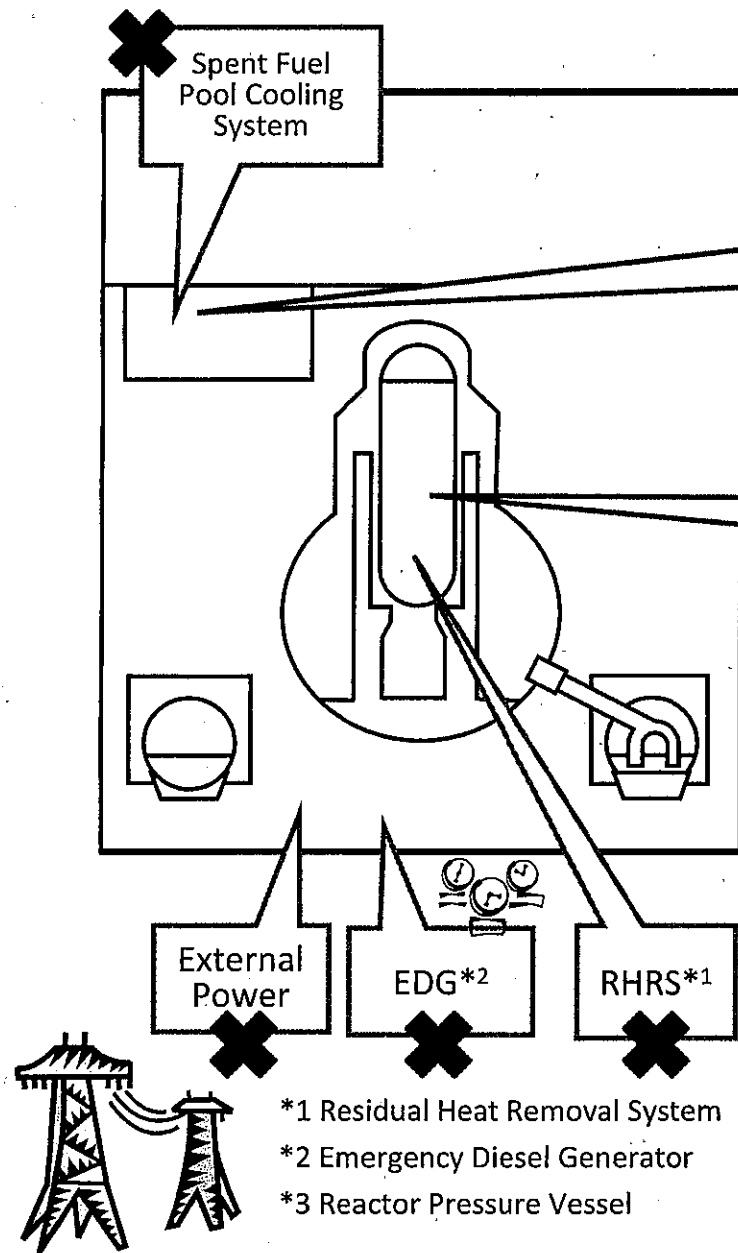


- 11th 14:46 Under operation, Automatic shutdown by the earthquake
- 11th 15:42 Report based on the Article 10 (Total loss of A/C power)
- 13th 05:10 Occurrence of the Article 15 event (Inability of water injection of the Emergency Core Cooling System)
- 13th 08:41 Started to vent.
- 13th 13:12 Started to inject seawater and borated water to core.
- 14th 05:20 Started to vent.
- 14th 07:44 Occurrence of the Article 15 event (Unusual rise of the pressure in PCV)
- 14th 11:01 Sound of explosion
- 16th around 08:30 White smoke generated.
- 17th 09:48 ~ 10:01 Water discharge by the helicopters of Self-Defense Force
- 17th 19:05 ~ 19:15 Water spray from the ground by High pressure water-cannon trucks of Police
- 17th 19:35 ~ 20:09 Water spray from the ground by fire engines of Self-Defense Force
- 18th before 14:00 ~ 14:38 Water spray from the ground by 6 fire engines of Self-Defense Force
- 18th ~ 14:45 Water spray from the ground by a fire engine of the US Military
- 19th 00:30 ~ 01:10 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- 19th 14:10 ~ 20th 03:40 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- 20th 11:00 Pressure of PCV rose (320kPa). Afterward fell.
- 20th 21:36 ~ 21st 03:58 Water spray by Hyper Rescue Unit of Tokyo Fire Department
- 21st about 15:55 Grayish smoke generated and was confirmed to be died down at 17:55.
- 22nd 15:10 ~ 16:00 Water spray by Hyper Rescue Unit of Tokyo Fire Department and Osaka City Fire Bureau.
- 22nd 22:46 Lighting in the Central Control Room was recovered.
- 23rd 11:03 ~ 13:20 Injection of about 35ton of sea water to the Spent Fuel Pool (SFP) via the Fuel Pool Cooling Line (FPC)
- 23rd around 16:20 Black smoke generated and was confirmed to died down at around 23:30 and 24th 04:50.
- 24th 05:35 ~ 16:05 Approximately 120 ton sea water injection to SFP via FPC
- 25th 13:28 ~ 16:00 Water spray by Kawasaki City Fire Bureau supported by Tokyo Fire Department
- 25th 18:02 Started fresh water injection to the core.
- 27th 12:34 ~ 14:36 Water spray by Concrete Pump Truck
- 28th 17:40 ~ 31st 8:40 Transferring the stagnant water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT) from the condensate storage tank (CST) to the suppression pool water surge tank (SPT)
- 28th 20:30 Switched to the water injection to the core using a temporary motor-driven pump.
- 29th 14:17 ~ 18:18 Fresh water spray by Concrete Pump Truck
- 31st 16:30 ~ 19:33 Fresh water spray by Concrete Pump Truck

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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4 (As of 6:00 April 1st, 2011)

Major events after the earthquake



In periodic inspection outage

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

No fuel is inside the reactor core

External Power

EDG*2

RHRS*1

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

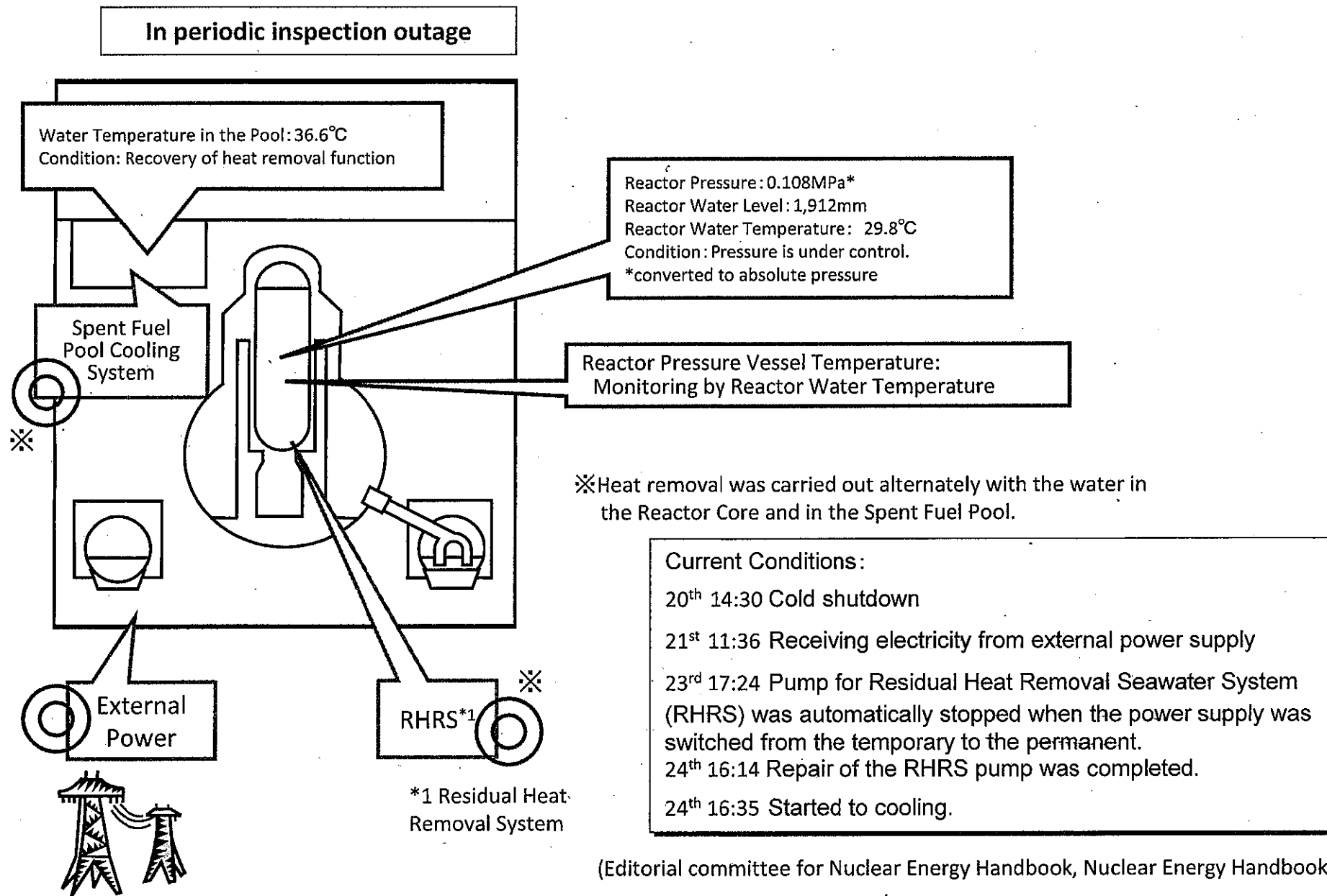
In periodic inspection outage when the earthquake occurred

- 14th 04:08 Water temperature in the Spent Fuel Pool (SFP), 84°C
- 15th 06:14 Confirmed the partial damage of wall in the 4th floor.
- 15th 09:38 Fire occurred in the 3rd floor. (12:25 extinguished)
- 16th 05:45 Fire occurred. TEPCO couldn't confirm any fire on the ground. (06:15)
- 20th 08:21~09:40 Water spray over SFP by Self-Defense Force
- 20th around 18:30~19:46 Water spray over SFP by Self-Defense Force
- 21st 06:37~08:41 Water spray over SFP by Self-Defense Force
- 21st about 15:00 Work for laying cable to Power Center was completed.
- 22nd 10:35 Power Center received electricity.
- 22nd 17:17~20:32 Water spray by Concrete Pump Truck
- 23rd 10:00~13:02 Water spray by Concrete Pump Truck
- 24th 14:36~17:30 Water spray by Concrete Pump Truck
- 25th 06:05~10:20 Sea water injection to SFP via the Fuel Pool Cooling Line (FPC)
- 25th 19:05~22:07 Water spray by Concrete Pump Truck
- 27th 16:55~19:25 Water spray by Concrete Pump Truck
- 29th 11:50 Lighting in the Central Control Room was recovered.
- 30th 14:04~18:33 Water spray by Concrete Pump Truck (Fresh water)
- 1st 8:28 Water spray by Concrete Pump Truck

**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 April 1st, 2011)



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

