

April 2, 2011

Nuclear and Industrial Safety Agency

Seismic Damage Information (the 69th Release)
(As of 16:00 April 2nd, 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 water, of which the dose rate was at the level of more than 1,000 mSv/h, was confirmed to be collected in the pit (a vertical portion of an underground structure) for laying power cables, located near the Intake Channel of Units 2. In addition, the outflow from the crack with a length of around 20 cm in the concrete portion of the lateral surface of the pit into the sea was confirmed. (Around 09:30 April 2nd)
- Water spray (fresh water) for Unit 3 using Concrete Pump Truck was carried out. (From 09:52 till 12:54 April 2nd)
- The second 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. (09:10 April 2nd)
- The transfer of fresh water from the barge (the first one) to the Filtrate Tank was resumed. (10:20 April 2nd)

2. Action taken by NISA

- Regarding the outflow of the liquid including radioactive materials from the area around the Intake Channel of Unit 2 of the Fukushima Dai-ichi NPS, NISA directed TEPCO orally to carry out nuclide analysis of the liquid sampled, to confirm whether there are other outflows from the

same parts of the facilities as the one, from which the outflow was confirmed around the Unit 2, and to strengthen monitoring through sampling water at more points around the facilities concerned.

< Possibility on radiation exposure >

Exposure of workers

- At around 11:35 April 1st, a worker fell into the sea when he went on board the barge of the US Armed forces in order to adjust the hose. He was rescued immediately by other workers around without any injury and external contamination. In order to make double sure, the existence of internal radionuclide contaminant is being confirmed by a whole-body counter.

For more information:

NISA English Home Page

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

April 3, 2011

Nuclear and Industrial Safety Agency

Seismic Damage Information (the 70th Release)
(As of 08:00 April 3rd, 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

- A test water spray over the Spent Fuel Pool of Unit 1 using Concrete Pump Truck was carried out in order to confirm the appropriate position for water spray. (From 17:16 till 17:19 April 2nd)
- In order to prepare to transfer the stagnant water on the basement floor of the turbine building of Unit 2 to the Condenser, the transfer of the water in the Condenser to the Condensate Storage Tank was started. (17:10 April 2nd)
- The cameras for monitoring the water levels in the vertical part of the trench outside of the turbine building of Unit 2 and on the basement floor of the turbine building of Unit 2 were installed. (April 2nd)

2. Others

- From 28 till 30 March, examinations of thyroid gland for 946 children aged from 0 to 15 years old were carried out at the Kawamata Town Community Center and the Iidate Village Office. The result was not at the level of having harmful influence.

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 14:00, April 2nd)

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 : 117 l/min (As of 16:18, April 1st) 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 : -1,650mm Fuel range B : -1,650mm (As of 12:00, April 2nd)	Fuel range A : -1,550mm (As of 12:00, April 2nd)	Fuel range A:-1,850mm Fuel range B:-2,250mm (As of 12:10, April 2nd)	#2	Shutdown range measurement 1,700mm (As of 14:00, April 2nd)	Shutdown range measurement 2,082mm (As of 14:00, April 2nd)
Reactor pressure	0.290MPa g(A) 0.531MPa g(B) (As of 12:00, April 2nd)	-0.007MPa g (A) -0.007MPa g (B) (As of 12:00, April 2nd)	0.014MPa g (A) -0.095MPa g (C) (As of 12:10, April 2nd)	#2	0.007MPa g (As of 14:00, April 2nd)	0.005MPa g (As of 14:00, April 2nd)
Reactor water temperature	(Impossible collection due to low system flow rate)			#2	30.4℃ (As of 14:00, April 2nd)	31.8℃ (As of 14:00, April 2nd)
Reactor Pressure Vessel (RPV) temperature	Feedwater nozzle temperature: 259.4℃ Temperature at the bottom head of RPV: 117.6℃ (As of 12:00, April 2nd)	Feedwater nozzle temperature: 152.9℃ Temperature at the bottom head of RPV: #1 (As of 12:00, April 2nd)	Feedwater nozzle temperature: 92.3℃ (under survey) Temperature at the bottom head of RPV: 117.8℃ (As of 12:10, April 2nd)	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: 0.155MPa abs S/C: 0.155MPa abs (As of 12:00, April 2nd)	D/W: 0.110MPa abs S/C: Down scale (under survey) (As of 12:00, April 2nd)	D/W: 0.1050MPa abs S/C: 0.1748MPa abs (As of 12:10, April 2nd)	#2		
CAMS*3	D/W: 4.51×10^1 Sv/h S/C: 1.60×10^1 Sv/h (As of 12:00, April 2nd)	D/W: 3.57×10^1 Sv/h S/C: 9.66×10^1 Sv/h (As of 12:00, April 2nd)	D/W: 2.32×10^1 Sv/h S/C: 9.35×10^1 Sv/h (As of 12:10, April 2nd)	#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	72.0℃ (As of 12:00, April 2nd)	#1	#1	37.1℃ (As of 14:00, April 2nd)	25.5℃ (As of 14:00, April 2nd)
FPC skimmer level	4,500mm (As of 12:00, April 2nd)	5,350mm (As of 12:00, April 2nd)	#1	5,100mm (As of 12:10, April 2nd)	#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 Unit5: We Correct the description of "other information" with respect to the data as of 2:00 and 6:00, April 2nd as follows: "Unit 5: SHC mode (From 22:12 April 1st)"	Common pool: about 32 °C (As of 7:30, April 2nd)	Unit5: SHC*5 mode (From 22:12 April 1st)	Unit6: Supplemental Fuel Pool Cooling mode (From 10:30 April 2nd)
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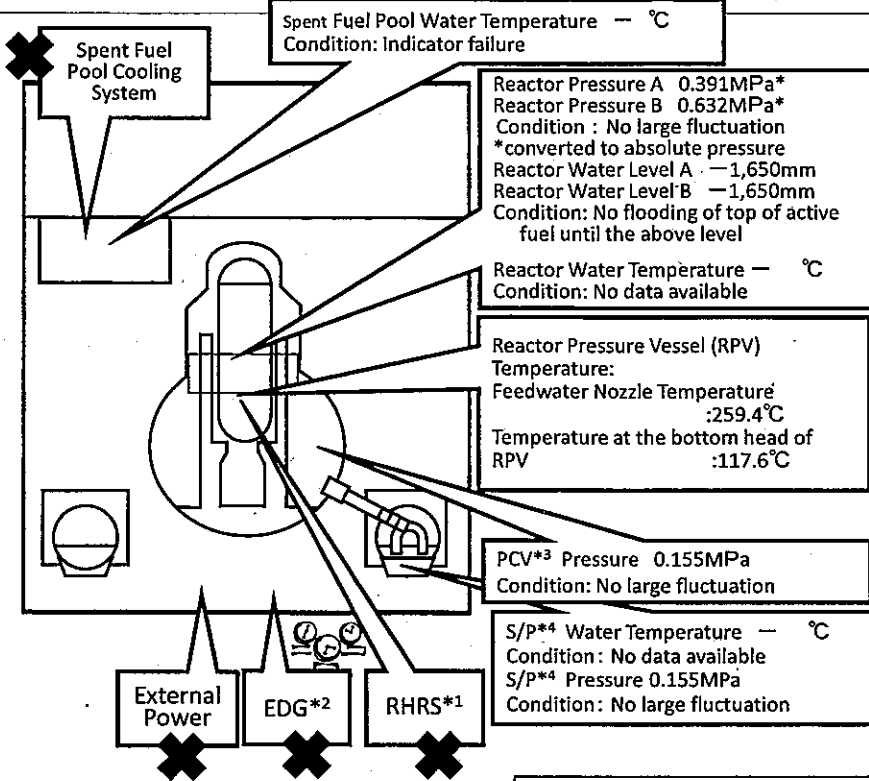
Pressure conversion	$\text{Gauge pressure (MPa g)} = \text{Absolute pressure (MPa abs)} - \text{Atmospheric pressure (Normal atmospheric pressure 0.1013MPa)}$ $\text{Absolute pressure (MPa abs)} = \text{Gauge pressure (MPa g)} + \text{Atmospheric pressure (Normal atmospheric pressure 0.1013MPa)}$
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- *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 14:00 April 2nd, 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)

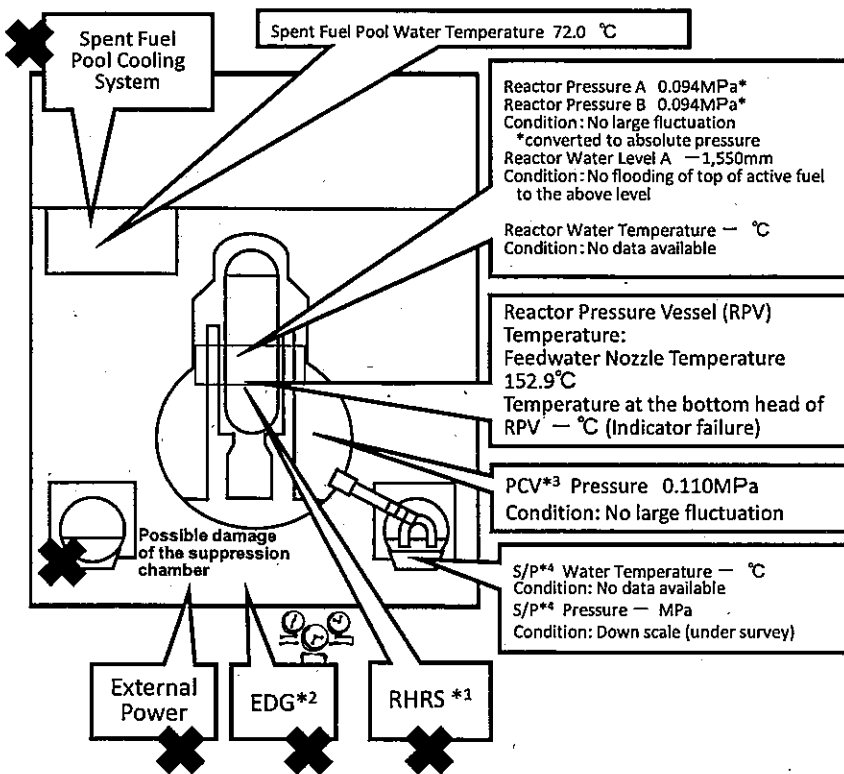
- *1 Residual Heat Removal System
- *2 Emergency Diesel Generator
- *3 Primary Containment Vessel
- *4 Suppression Pool

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 14:00 April 2nd, 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.
- 29th 16:45 ~1st 11:50 Transferred the stagnant water from the Condensate Storage Tank (CST) to the Surge Tank of Suppression Pool Water (SPT)
- 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)
- 1st 14:56 ~17:05 Injection of fresh water from FPC to SFP using the temporary motor-driven pump.

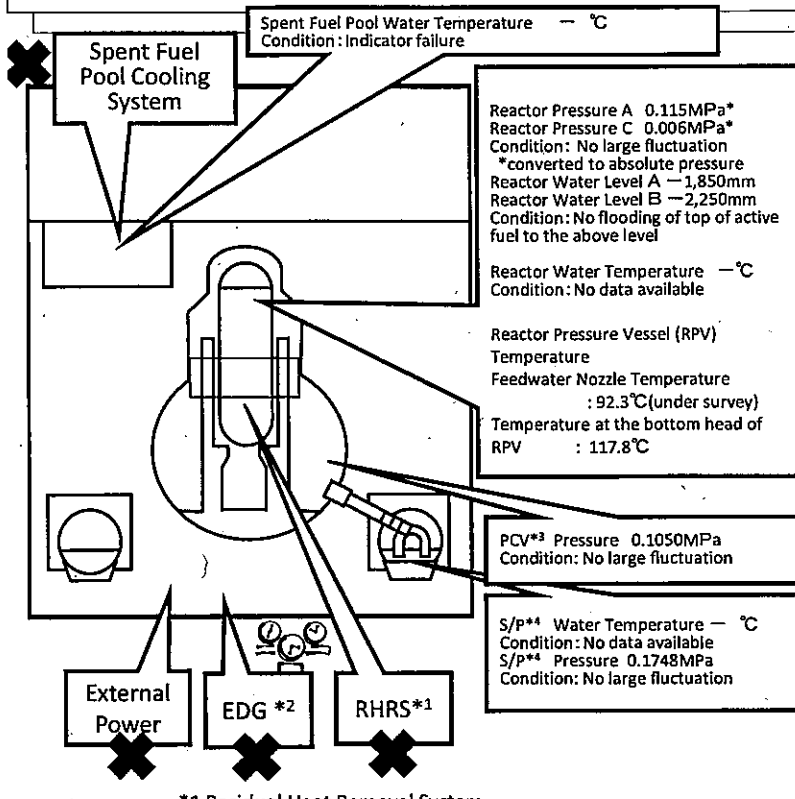
- *1 Residual Heat Removal System
- *2 Emergency Diesel Generator
- *3 Primary Containment Vessel
- *4 Suppression Pool

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 3

(As of 14:00 April 2nd, 2011)



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

Reactor Pressure A 0.115MPa*
Reactor Pressure C 0.006MPa*
Condition: No large fluctuation
*converted to absolute pressure
Reactor Water Level A —1,850mm
Reactor Water Level B —2,250mm
Condition: No flooding of top of active fuel to the above level

Reactor Water Temperature — °C
Condition: No data available

Reactor Pressure Vessel (RPV)
Temperature
Feedwater Nozzle Temperature : 92.3°C (under survey)
Temperature at the bottom head of RPV : 117.8°C

PCV*3 Pressure 0.1050MPa
Condition: No large fluctuation

S/P**4 Water Temperature — °C
Condition: No data available
S/P**4 Pressure 0.1748MPa
Condition: No large fluctuation

- *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

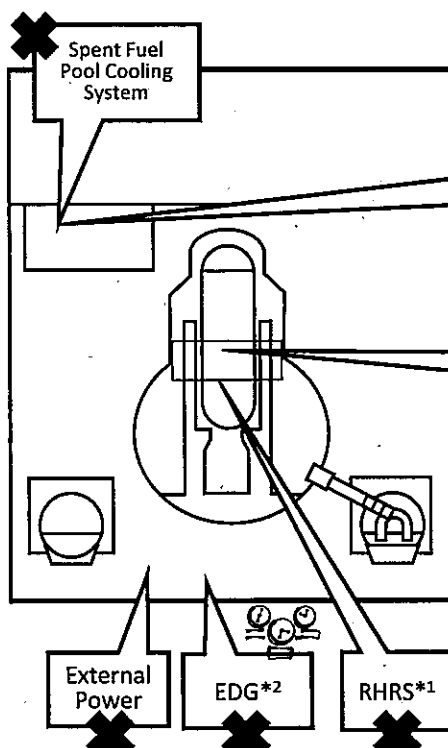
(Editorial committee for Nuclear Energy Handbook, Nuclear Energy Handbook)

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 be 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
- 2nd 09:52~12:54 Fresh water spray by Concrete Pump Truck

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 4

(As of 14:00 April 2nd, 2011)



In periodic inspection outage

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

No fuel is inside the reactor core

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

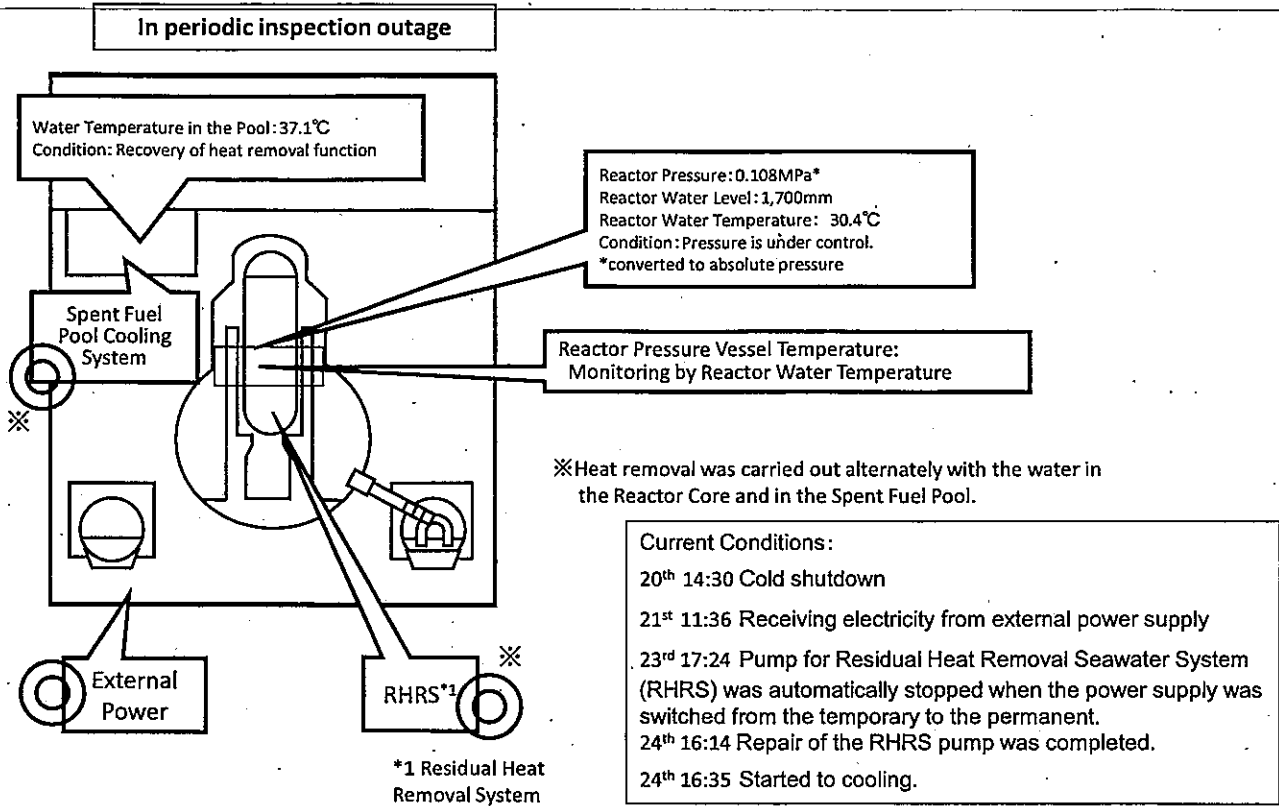
Current Conditions: No fuel is in RPV*3.
Fresh water is being injected to the Spent Fuel Pool.

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

Major events after the earthquake

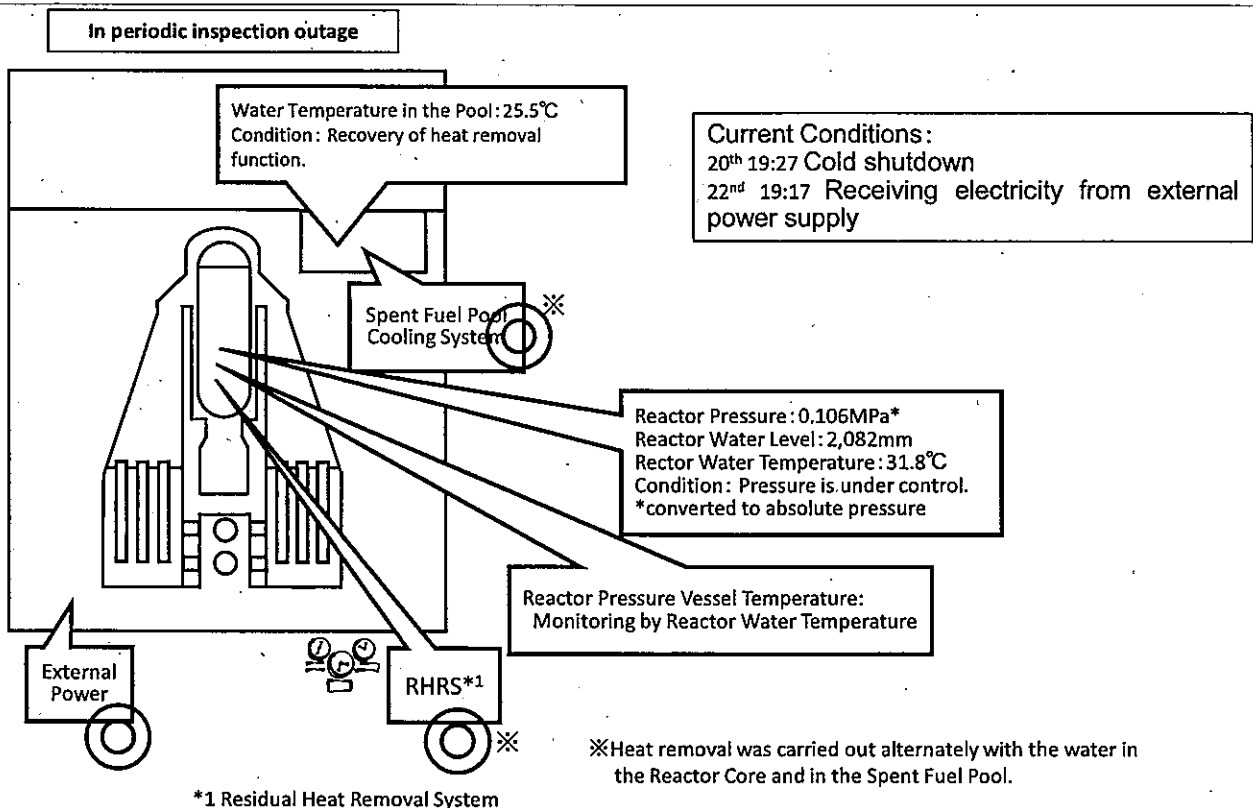
- In periodic inspection outage when the earthquake occurred
- 14th 04:08 Water temperature in the Spent Fuel Pool (SFP), 84°C
- 15th 06:14 Confirmed the partial damage of wall in the 4th floor.
- 15th 09:38 Fire occurred in the 3rd floor. (12:25 extinguished)
- 16th 05:45 Fire occurred. TEPCO couldn't 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 8:28~14:14 Water spray by Concrete Pump Truck(Fresh water)

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 5 (As of 14:00 April 2nd, 2011)



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

Conditions of Fukushima Dai-ichi Nuclear Power Station Unit 6 (As of 14:00 April 2nd, 2011)



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