Status of nuclear power plants in Fukushima as of 16:00 March 21 (Estimated by JAIF)

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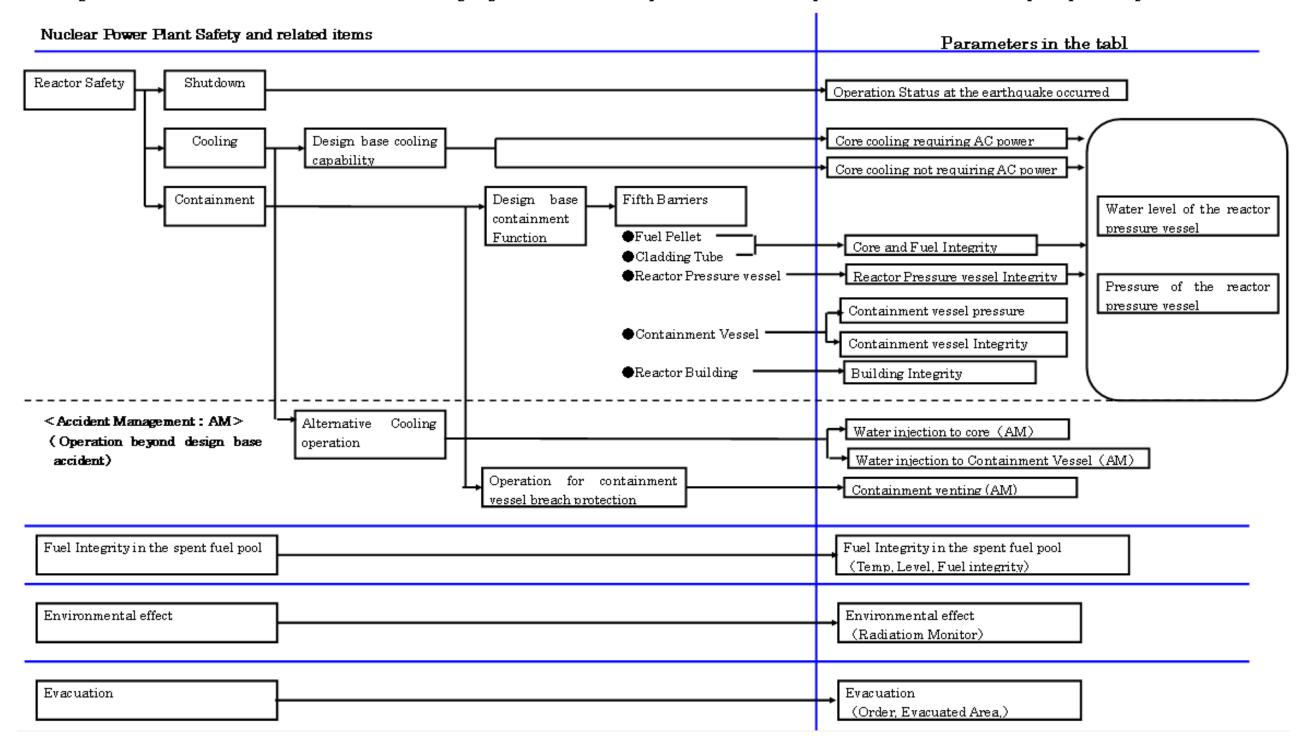
Power Station			Fukushima Dai−ichi Nuc	clear Power Station				
Unit	1	2	3	4	5	6		
Electric / Thermal Power output (MW)	460 / 1380	784 / 2381	784 / 2381	784 / 2381	784 / 2381	1100 /3293		
Type of Reactor	BWR-3	BWR-4	BWR-4	BWR-4	BWR-4	BWR-5		
Operation Status at the earthquake occurred	In Service -> Shutdown	In Service -> Shutdown	In Service -> Shutdown	Outage	Outage	Outage		
Core and Fuel Integrity	Damaged	Damaged	Damaged	No fuel rods	Not Damaged	Not Damaged		
Reactor Pressure Vessel Integrity	Unknown	Unknown	Unknown	Not Damaged	Not Damaged	Not Damaged		
Containment Vessel Integrity	Not Damaged	Damage Suspected	Might be "Not damaged"	Not Damaged	Not Damaged	Not Damaged		
Core cooling requiring AC power	Not Functional	Not Functional	Not Functional	Not necessary	Not necessary	Not necessary		
					(AC power available)	(AC power Available)		
Core cooling not requiring AC power	Not Functional	Not Functional	Not Functional	Not necessary	Not necessary	Not necessary		
Building Integrity	Severely Damaged (Hydrogen Explosion) Slightly Damaged (Hydrogen Explosion)		Severely Damaged (Hydrogen Explosion) Open a vent hole on the rooftop for avoiding hydrogen explosion					
Water Level of the Rector Pressure Vessel	Fuel exposed partially or fully	Fuel exposed partially or fully	Fuel exposed partially or fully	Safe	Safe (in cold shutdown)	Safe (in cold shutdown)		
Pressure of the Reactor Pressure Vessel	Stable	Unknown	Stable	Safe	Safe	Safe		
Containment Vessel Pressure	<u>Stable</u>	<u>Stable</u>	Decreasing after increase in Mar., 20th	Safe	Safe	Safe		
Nater injection to core (Accident Management)	Continuing (Seawater)	Continuing(Seawater)	Continuing(Seawater)	Not necessary	Not necessary	Not necessary		
Water injection to Containment Vessel (AM)	Continuing (Seawater)	to be decided(Seawater)	Continuing(Seawater)	Not necessary	Not necessary	Not necessary		
Containment venting (AM)	Temporally stopped	Temporally stopped	Temporally stopped	Not necessary	Not necessary	Not necessary		
Fuel Integrity in the spent fuel pool	Water injection to be considered	Seawater Injection conducted in Mar. 20th	Water level low,	Water level low, Seawater spray continue	Pool cooling capability was recovered			
	considered	<u>Mar. Zotri</u>	certain effect was confirmed	Hydrogen from the pool exploded	Water temp. has decreased	Water temp. has decreased		
Environmental effect	The West Gate: 269.5 μ Sv/h at 05:40, Mar. 20 North of Service Building: 2105.0 μ Sv/h at 13:00, Mar. 21 Radio nuclides were detected in milk produced in Fukushima prefecture and spinach from Ibaragi prefecture.							
				C 1				
			who live between 20km to 30km		S are to stay indoors.			
Evacuation INES (estimated by NISA)	been confirmed based on the	Level 5 of the fuels in the fuel pool outside declining trend of radiation monito	Level 5 the containment vessel. The or red. Seawater injection to the page 1.	Level 3 peration for spraying water to the pool was conducted at Unit-2 on I	pool is continuing at Uni-3 a Mar. 20th.			
INES (estimated by NISA)	Immediate threat is damage of been confirmed based on the The pressure of the containmed Monitoring the pressure continuous to recover AC power for the contains the pressure continuous to recover AC power for the contains the	Level 5 of the fuels in the fuel pool outside declining trend of radiation monitoment vessel of Unit-3 has decrease inues. or Unit-1through 6 is in progress.	the containment vessel. The opered. Seawater injection to the period after increase in the morning of the External AC power has reached	Level 3 peration for spraying water to the pool was conducted at Unit-2 on I of Mar. 20th. Judging from the situation the distribution switchboard for	pool is continuing at Uni-3 a Mar. 20th. uation, immediate pressure re or Unit-2. Integrity check of	nd 4 and certain effect has		
INES (estimated by NISA) Remarks	Immediate threat is damage of been confirmed based on the The pressure of the containmed Monitoring the pressure continuous to recover AC power for the contains the pressure continuous to recover AC power for the contains the	Level 5 of the fuels in the fuel pool outside declining trend of radiation monitoment vessel of Unit-3 has decrease inues. or Unit-1through 6 is in progress. one before energizing them. Exter	the containment vessel. The opered. Seawater injection to the plant of after increase in the morning of the external AC power has reached and AC power has also reached the external AC power has also reached the ex	Level 3 peration for spraying water to the pool was conducted at Unit-2 on I of Mar. 20th. Judging from the situation the distribution switchboard for	pool is continuing at Uni-3 a Mar. 20th. uation, immediate pressure re or Unit-2. Integrity check of	nd 4 and certain effect has		
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INES: International Nuclear Event Scale NISA: Nuclear and Industrial Safety Agency TEPCO: Tokyo Electric Power Company, Inc.



Parameters in the Table

JAIF picks up these parameters to evaluate safety condition of the nuclear plants during this accident from the view point of the principles of nuclear power plant safety, which are "Shutdown", "Cooling" and "Containment". Then we create the chart. The following diagram is to show the correspondence relation of these parameters in the table to nuclear power plant safety.



Accidents of Fukushima Dai-ichi and Fukushima-Dai-ni Nuclear Power Stations

(March 21, 2011 12:00)

1. Latest Major Incidents and Actions

<March 19>

05:00: AC power source provided by emergency diesel generator becomes available at unit-5 and 6. Cooling of the spend fuel pool started at unit-5.

08:10: Radiation measured at the west gate of the power station is 830.8 μSv/h.

22:14: Cooling of the spend fuel pool started at unit-6.

<March 20>

14:30: Unit-5 cold shutdown

15:05 - 17:20: Seawater injection to the spent fuel pool has been conducted at unit-2

19:27: Unit-6 cold shutdown

2. Chronology of Nuclear Power Stations

(1) Fukushima Dai-ichi NPS

	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5, 6
Major Incidents and Actions	11th 15:42 Report IAW Article 10* (Loss of power)	11th 15:42 Report IAW Article 10* (Loss of power)	11th 15:42 Report IAW Article 10* (Loss of power)	14th 04:08 Water temperature in Spent Fuel Storage Pool increased at 84°C	Water temperature in SF Storage Pool is increasing
The Act on Special Measures Concerning Nuclear Emergency Preparedness	11th 16:36 Event falling under Article 15 occurred (Incapability of water injection by core cooling function)	11th 16:36 Event falling under Article 15* occurred (Incapability of water injection by core cooling function)	13th 05:10 Event falling under Article 15* occurred (Loss of reactor cooling functions)	15th 09:38 Fire occurred on 3rd floor (extinguished spontaneously)	18th Vent hole was opened on the rooftop for avoiding hydrogen explosion
	12th 00:49 Event falling under Article 15* occurred (Abnormal rise of CV pressure)	14th 13:25 Event falling under Article 15* occurred (Loss of reactor cooling functions)	13th 08:41 Start venting	16th 05:45 Fire occurred (extinguished spontaneously)	19th 05:00 RHR-pump in the Unit-5 restarted. 22:14 RHR-pump in the Unit-6 restarted
	12th 14:30 Start venting	14th 16:34 Seawater injection to RPV	13th 13:12 Seawater injection to RPV	Since 20th, operation of spraying water to the spent fuel pool continues.	20th 14:30 Reactor cold shutdown at Unit-5 20th 19:27 Reactor cold shutdown at Unit-6
	12th 15:36 Hydrogen explosion	14th 22:50 Report IAW Article 15* (Abnormal rise of CV pressure)	14th 07:44 Event falling under Article 15* occurred (Abnormal rise of CV		
1	12th 20:20 Seawater injection to RPV	15th 00:00 Start venting	14th 11:01 Hydrogen explosion		
		15th 06:10 Sound of explosion, Suppression Pool damaged	15th 10:22 Radiation dose 400mSv/h		
		15th 08:25 White smoke reeked	16th 06:40, 08:47 Radiation dose 400mSv/h		
		20t 15:05, operation of seawater injection to the spent fuel pool was conducted	16th 08:34, 10:00 White smoke reeked		
			Since 17th, operation of spraying water to the spent fuel pool		
	Work to recover external AC power is in progress. External AC power has reached to the unit. Integrity check of electric equipment is going on.		External power supply of Unit 3 and 4 is to be connected.		Work to recover external AC power is in progress. External AC power has reached to the unit.
Major Data	Water level (<u>21st 03:00</u>) (A) <u>-1750</u> mm (B) <u>-1800</u> mm	Water level (21st 03:00) -1350mm	Water level (<u>21st 04:00</u>) (A) - <u>1650</u> mm, (B) <u>-1950</u> mm	Water temperature of SF Storage Pool Immeasurable (since 14th 04:08)	Water temperature of SF Storage Pool (21st 05:00) Unit 5 39.5°C Unit 6 32.0°C
	Reactor pressure (<u>21st 03:00</u>) (A) <u>0.194</u> MPaG, (B) <u>0.158</u> MPaG	Reactor pressure (<u>21st 03:00</u>) (A) <u>-0.018</u> MPaG, (B) <u>-0.020</u> MPaG	Reactor pressure (<u>21st 04:00</u>) (A) - <u>0.027</u> MPaG, (B) <u>0.214</u> MPaG		
(2) Eukushima Dai ni NDDa	CV pressure (<u>21st 03:00</u>) <u>0.16</u> MPaabs	CV pressure (<u>21st 03:00</u>) <u>0.12</u> MPaabs	CV pressure 0.340MPaabs (20th 04:30) 0.290MPaabs (20th 16:00) 0.160MPaabs (21st 04:00)		

(2) Fukushima Dai-ni NPPs

All units are cold shutdown (Unit-1, 2, 4 have been recovered from a event falling under Article 15*)

3. State of Emergency Declaration

11th 19:03 State of nuclear emergency was declared (Fukushima Dai-ni NPS)

12th 07:45 State of nuclear emergency was declared (Fukushima Dai-ichi NPS)

4. Evacuation Order

11th 21:23 PM direction: for the residents within 3km radius from Fukushima I to evacuate, within 10km radius from Fukushima I to stay in-house

12th 05:44 PM direction: for the residents within 10km radius from Fukushima I to evacuate

12th 17:39 PM direction: for the residents within 10km radius from Fukushima II to evacuate

12th 18:25 PM direction: for the residents within 20km radius from Fukushima I to evacuate

15th 11:06 PM direction: for the residents within 20-30km radius from Fukushima I to stay in-house



Status of the Nuclear Power Plants after the Earthquake

