Status of nuclear power plants in Fukushima as of 22:00 March 20 (Estimated by JAIF)

Power Station	Fukushima Daiichi Nuclear 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 (AC power available)	Not necessary (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	Severely 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	Safe
Pressure of the Reactor Pressure Vessel	Stable	Unknown	Stable	Safe	Safe	Safe
Containment Vessel Pressure	Unknown	Low	Stable at higher level after increase (March, 20th)	Safe	Safe	Safe
Water 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 continue	Water level low, Seawater spray continue and certain effect was confirmed	Water level low, Seawater spray continue Hydrogen from the pool exploded	pool cooling capability was recovered	pool cooling capability was recovered
Environmental effect	The West Gate: 269.5 μSv/h at 05:40, Mar. 20 North of Service Building: 3054.0 μSv/h at 15:00, Mar. 20 Radio nuclides were detected in milk produced in prefecture and spinach from Ibaragi prefecture.					
Evacuation	20km from NPS ＊People who live between 20km to 30km from the Fukushima #1NPS are to stay indoors.					
INES (estimated by NISA)	Level 5	Level 5	Level 5	Level 3	—	—
Remarks	Immediate threat is damage of the fuels in the fuel pool outside the containment vessel. The operation for spraying water to the pool continue at uni-3 and 4 and certain effect was confirmed Seawater injection to the pool started at unit-2 today (20th). The pressure of the containment vessel increased at unit-3 in this morning (20th) . The pressure became stable at higher level after this increase . Work to recover AC power is in progress. External AC power cable is connected to the distribution switchboard for Unit-1 and unit-2.					

Power Station	Fukushima Daini Nuclear Power Station			
Unit	1	2	3	4
Electric / Thermal Power output (MW)	1100 / 3293			
Type of Reactor	BWR-5	BWR-5	BWR-5	BWR-5
Operation Status at the earthquake occurred	In Service -> Automatic Shutdown			
Status	All the units are in cold shutdown.			
INES (estimated by NISA)	Level 3	Level 3	—	Level 3
Remarks	Unit-1, 2, 3 & 4, which were in full operation when the earthquake occurred, all shutdown automatically. External power supply was available after the quake. While injecting water into the reactor pressure vessel using make-up water system, TEPCO recovered the core cooling function and made the unit into cold shutdown state one by one. Latest Monitor Indication: 15.9 μSv/h at 12:00, Mar. 17 at NPS border Evacuation Area: 10km from NPS			

Power Station	Onagawa Nuclear Power Station		
Unit	1	2	3
Operation Status at the earthquake occurred	In Service -> Automatic Shutdown		
Status	All the units are in cold shutdown.		
Remarks	Safe		

Power Station	Tokai Daini
Operation Status at the earthquake occurred	In Service -> Automatic Shutdown
Status	In cold shutdown.
Remarks	Safe.

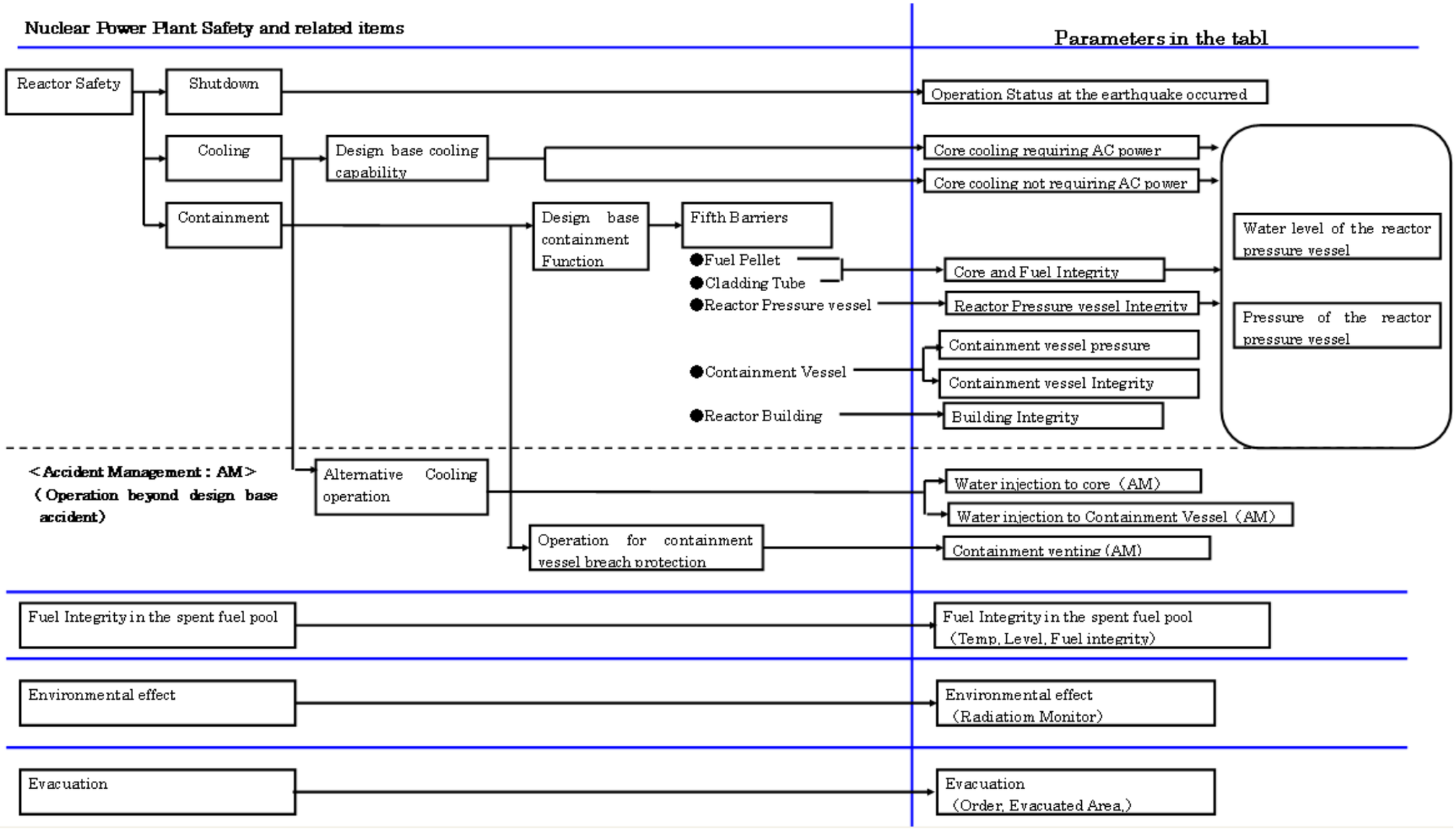
[Significance judged by JAIF]
- Low
- High
- Severe (Need immediate action)

[Source]
Governmental Emergency Headquarters: News Release (-3/19 17:00), Press conference
NISA: News Release (-3/19 13:30), Press conference
TEPCO: Press Release (-3/19 18:00), Press Conference

[Abbreviations]
INES: International Nuclear Event Scale
NISA: Nuclear and Industrial Safety Agency
SFP: spent fuel pool
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 20, 2011 17:00)

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>
15:05: Seawater injection to the spent fuel pool started at unit-2

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 **The Act on Special Measures Concerning Nuclear Emergency Preparedness*	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℃	Water temperature in SF Storage Pool is increasing
	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.
	12th 14:30 Start venting	14th 16:34 Seawater injection to RPV	13th 13:12 Seawater injection to RPV	20th 08:20 operation of spraying water to the spent fuel pool started	
	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 pressure)		
	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 started	16th 08:34, 10:00 White smoke reeked		
			Since 17th, operation of spraying water to the spent fuel pool continue		
	Work to recover external AC power is in progress.		External power supply of Unit 3 to 6 are to be connected.		
Major Data	Water level (20th 05:00) (A) -1750mm (B) -1750mm	Water level (20th 05:30) -1300mm	Water level (20th 04:30) (A) -1950mm, (B) -2300mm	Water temperature of SF Storage Pool Unmesurable (since 14th 04:08)	Water temperature of SF Storage Pool (20th 09:00) Unit 5 36.1℃ Unit 6 36.5℃
	Reactor pressure (20th 05:00) (A) 0.203MPaG, (B) 0.162MPaG	Reactor pressure (20th 05:00) (A) -0.014MPaG, (B) -0.029MPaG	Reactor pressure (20th 04:30) (A) 0.180MPaG, (B) 0.216MPaG		
	CV pressure (20th 00:00) 0.18MPaabs	CV pressure (20th 05:00) 0.130MPaabs	CV pressure (20th 04:30) 0.340MPaabs		

(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

The accident that brings environmental impact is going on at several unit in Fukushima Daiichi Nuclear Power Station after the earthquake occurred on March 11th.Other nuclear power plants in Japan are in normal operation or safely shutdown.