<table>
<thead>
<tr>
<th>Power Station</th>
<th>Type of Reactor</th>
<th>Electric / Thermal Power output (MW)</th>
<th>Operation Status at the earthquake occurred</th>
<th>Core and Fuel Integrity</th>
<th>Reactor Pressure Vessel Integrity</th>
<th>Containment Vessel Integrity</th>
<th>Core cooling requiring AC power 1</th>
<th>Core cooling requiring AC power 2</th>
<th>Core cooling not requiring AC power</th>
<th>Building Integrity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fukushima Dai-ichi Nuclear Power Station</strong></td>
<td>BWR-3</td>
<td>460 / 1380</td>
<td>In Service -&gt; Shutdow</td>
<td>Damaged</td>
<td>Unknown</td>
<td>Not Damaged</td>
<td>Not Functional</td>
<td>Not Functional</td>
<td>Not Functional</td>
<td>Severely Damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BWR-4</td>
<td>784 / 2381</td>
<td>In Service -&gt; Shutdown</td>
<td>Damaged</td>
<td>Unknown</td>
<td>Not Damaged</td>
<td>Not Functional</td>
<td>Not Functional</td>
<td>Not Functional</td>
<td>Slightly Damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BWR-4</td>
<td>784 / 2381</td>
<td>In Service -&gt; Shutdown</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not Functional</td>
<td>Functioning</td>
<td>Not necessary</td>
<td>Severely Damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BWR-5</td>
<td>784 / 2381</td>
<td>Outage</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not necessary</td>
<td>Functioning</td>
<td>Not necessary</td>
<td>Severely Damaged</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1100 / 3293</td>
<td>Outage</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not Damaged</td>
<td>Not necessary</td>
<td>Functioning</td>
<td>Not necessary</td>
<td>Severely Damaged</td>
<td></td>
</tr>
</tbody>
</table>

**Operation Status at the earthquake occurred**

- **Unit 1**: In Service -> Shutdow
- **Unit 2**: In Service -> Shutdow
- **Unit 3**: In Service -> Shutdow
- **Unit 4**: Outage
- **Unit 5**: Outage
- **Unit 6**: Outage

**Core and Fuel Integrity**

- **Unit 1**: Damaged
- **Unit 2**: Damaged
- **Unit 3**: Damaged
- **Unit 4**: Not Damaged
- **Unit 5**: Not Damaged
- **Unit 6**: Not Damaged

**Reactor Pressure Vessel Integrity**

- **Unit 1**: Damaged
- **Unit 2**: Damaged
- **Unit 3**: Damaged
- **Unit 4**: Not Damaged
- **Unit 5**: Not Damaged
- **Unit 6**: Not Damaged

**Containment Vessel Integrity**

- **Unit 1**: Not Damaged
- **Unit 2**: Damage Suspected
- **Unit 3**: Might be Not Damaged
- **Unit 4**: Not Damaged
- **Unit 5**: Not Damaged
- **Unit 6**: Not Damaged

**Core cooling requiring AC power 1**

- **Unit 1**: Not Functional
- **Unit 2**: Not Functional
- **Unit 3**: Not Functional
- **Unit 4**: Not necessary
- **Unit 5**: Functioning (in cold shutdown)
- **Unit 6**: Not necessary

**Core cooling requiring AC power 2**

- **Unit 1**: Not Functional
- **Unit 2**: Not Functional
- **Unit 3**: Not Functional
- **Unit 4**: Not necessary
- **Unit 5**: Functioning (in cold shutdown)
- **Unit 6**: Not necessary

**Core cooling not requiring AC power**

- **Unit 1**: Not Functional
- **Unit 2**: Not Functional
- **Unit 3**: Not Functional
- **Unit 4**: Not necessary
- **Unit 5**: Not necessary
- **Unit 6**: Not necessary

**Building Integrity**

- **Unit 1**: Severely Damaged (Hydrogen Explosion)
- **Unit 2**: Slightly Damaged (Hydrogen Explosion)
- **Unit 3**: Severely Damaged (Hydrogen Explosion)
- **Unit 4**: Severely Damaged (Hydrogen Explosion)
- **Unit 5**: Severely Damaged (Hydrogen Explosion)
- **Unit 6**: Severely Damaged (Hydrogen Explosion)

**Environmental effect**

- **Fukushima Dai-ichi Nuclear Power Station**
  - Water injection to core (Accident Management): Seawater injection conducted in cold shutdown.
  - Water injection to Containment Vessel (AM): Seawater injection to be decided.
  - Core cooling: Seawater injection to the pool was conducted at Unit 2 on Mar. 20th.
  - Work to recover AC power for Unit 1 through 6 is in process.
  - External AC power has partly replaced with the power from emergency diesel generator in Unit 5.

- **Onagawa Nuclear Power Station**
  - Water injection to core (Accident Management): Seawater injection conducted in cold shutdown.
  - Water injection to Containment Vessel (AM): Seawater injection to be decided.
  - Core cooling: Seawater injection was conducted.

- **Tokai Dai-ii**
  - Water injection to core (Accident Management): Seawater injection conducted in cold shutdown.
  - Water injection to Containment Vessel (AM): Seawater injection to be decided.
  - Core cooling: Seawater injection was conducted.

**Evacuation Area**

- **Fukushima Dai-ichi Nuclear Power Station**: 20km from NPS
- **Onagawa Nuclear Power Station**: 10km from NPS

**Remarks**

- **Fukushima Dai-ichi Nuclear Power Station**: Work to recover AC power for Unit 1 through 6 is in progress. External AC power has reached to the units. Integrity check of electric equipment is going on in each unit, which must be done before energizing them. External AC power has partly replaced with the power from emergency diesel generator in Unit 5.
- **Onagawa Nuclear Power Station**: Work to recover AC power for Unit 2 is in progress.
- **Tokai Dai-ii**: Work to recover AC power for Unit 3 is in progress.

**INES (estimated by NISA)**

- **Level 5**: Low
- **Level 5**: High
- **Level 3**: Severe (Need immediate action)

**[Significance judged by JAIF]**

- **Low**
- **High**
- **Severe (Need immediate action)**

**[Source]**

- Governmental Emergency Headquarters: News Release (-3/22 13:00), Press conference
- NISA: News Release (-3/22 7:30), Press conference

**[Abbreviations]**

- INES: International Nuclear Event Scale
- NISA: Nuclear and Industrial Safety Agency
- TEPCO: Tokyo Electric Power Company, Inc.
JAIF picks up these parameters to evaluate safety condition of the nuclear plants during this accident from the viewpoint 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.
1. Latest Major Incidents and Actions

- **March 20th**
  - 14:30: Unit 5 cold shutdown
  - 19:27: Unit 6 cold shutdown

- **March 21st**
  - 15:55: Slightly gray smoke erupted from Unit 3 (18:02: seemingly stopped)
  - 18:22: White smoke erupted from Unit 2

2. Chronology of Nuclear Power Stations

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 11th</td>
<td>Report IAW Article 10* (Loss of power)</td>
</tr>
<tr>
<td>March 11th</td>
<td>Event falling under Article 15* (Abnormal rise of CV pressure)</td>
</tr>
<tr>
<td>March 12th</td>
<td>Event falling under Article 15* (Abnormal rise of CV pressure)</td>
</tr>
<tr>
<td>March 15th</td>
<td>Event falling under Article 15* (Abnormal rise of CV pressure)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 16th</td>
<td>Water temperature in Spent Fuel Storage Pool increased at 84 °C</td>
</tr>
<tr>
<td>March 16th</td>
<td>Fire occurred on 3rd floor (extinguished spontaneously)</td>
</tr>
<tr>
<td>March 18th</td>
<td>Hydrogen explosion</td>
</tr>
<tr>
<td>March 18th</td>
<td>Report IAW Article 15* (Abnormal pressure)</td>
</tr>
<tr>
<td>March 19th</td>
<td>Sound of explosion, Suppression Pool damaged</td>
</tr>
<tr>
<td>March 20th</td>
<td>Seawater injection to RPV</td>
</tr>
<tr>
<td>March 20th</td>
<td>Reactor cold shutdown at Unit-5</td>
</tr>
<tr>
<td>March 20th</td>
<td>Reactor cold shutdown at Unit-6</td>
</tr>
</tbody>
</table>

3. State of Emergency Declaration

- **March 11th 19:03**: State of nuclear emergency was declared (Fukushima Dai-ichi NPS)
- **March 12th 07:45**: State of nuclear emergency was declared (Fukushima Dai-ni NPS)

4. Evacuation Order

- **March 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
- **March 12th 05:44 PM**: Direction: for the residents within 10km radius from Fukushima I to evacuate
- **March 12th 17:39 PM**: Direction: for the residents within 10km radius from Fukushima I to evacuate
- **March 12th 18:25 PM**: Direction: for the residents within 20km radius from Fukushima I to evacuate
- **March 15th 11:06 PM**: Direction: for the residents within 20-30km radius from Fukushima I to stay in-house

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**Major Data**

<table>
<thead>
<tr>
<th>Unit 1</th>
<th>Unit 2</th>
<th>Unit 3</th>
<th>Unit 4</th>
<th>Unit 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water level (22nd 06:00)</td>
<td>Water level (22nd 06:00)</td>
<td>Water level (22nd 05:30)</td>
<td>Water temperature of SFP (22nd 05:30)</td>
<td>Water level (22nd 06:00)</td>
</tr>
<tr>
<td>A: -1750mm, B: 1700mm</td>
<td>A: -1750mm, B: 1700mm</td>
<td>A: -1750mm, B: 1700mm</td>
<td>Water temperature of SFP (22nd 06:00)</td>
<td>Water level (22nd 06:00)</td>
</tr>
<tr>
<td>Reactor pressure (A) 0.196MPaG, (B) 0.167MPaG</td>
<td>Reactor pressure (A) 0.196MPaG, (B) 0.167MPaG</td>
<td>Reactor pressure (A) 0.196MPaG, (B) 0.167MPaG</td>
<td>Reactor pressure (A) 0.196MPaG, (B) 0.167MPaG</td>
<td>Reactor pressure (A) 0.196MPaG, (B) 0.167MPaG</td>
</tr>
<tr>
<td>CV pressure 0.16MPaabs</td>
<td>CV pressure 0.16MPaabs</td>
<td>CV pressure 0.16MPaabs</td>
<td>CV pressure 0.16MPaabs</td>
<td>CV pressure 0.16MPaabs</td>
</tr>
<tr>
<td>Water temperature of SFP (22nd 06:00) 31°C</td>
<td>Water temperature of SFP (22nd 06:00) 31°C</td>
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</tr>
</tbody>
</table>

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**Fukushima Dai-ni NPPs**

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

**EDF**: Emergency Diesel Generator
The accident that brings environmental impact is going on at several units 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.