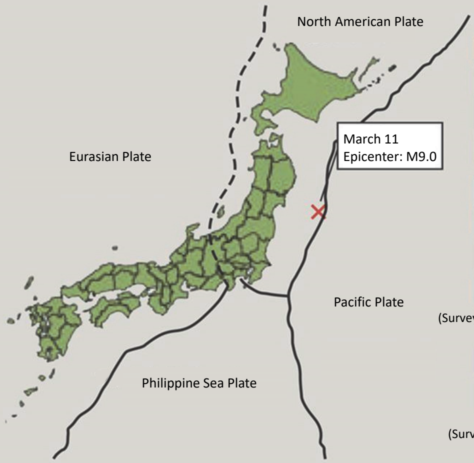
Fukushima Daiichi Nuclear Power Station (NPS) Accident

Damage due to the Great East Japan Earthquake

- A 9.0-magnitude earthquake occurred off the coast of Sanriku at 14:46 p.m. on Friday, March 11, 2011. The Earthquake and subsequent tsunami caused severe damage mainly to the Tohoku region.
- The earthquake was the largest ever recorded in Japan and the fourth biggest in the world since 1900.



Human damage	
Dead	15,894
Missing	2,546
Injured	6,156

Damage to buildings	
Completely destroyed	121,772
Half destroyed	280,921
Partially destroyed	726,509

(Surveyed by the National Police Agency; as of December 8, 2017)

Disaster victim support	
Evacuees nationwide	75,206

(Surveyed by the Reconstruction Agency; as of January 16, 2018)

A big earthquake centered off the coast of Sanriku occurred, at 14:46 p.m. on Friday, March 11, 2011. The seismic intensity of 7 on the Japanese earthquake scale was measured in Kurihara City, Miyagi Prefecture. This 9.0-magnitude earthquake was the biggest recorded in Japan since 1923 and the highest level in the world, equivalent to the 2010 Chili Earthquake (M8.8).

Included in this reference material on March 31, 2013
Updated on February 28, 2018

Fukushima Daiichi Nuclear Power Station (NPS) Accident

Accident at the Nuclear Power Station

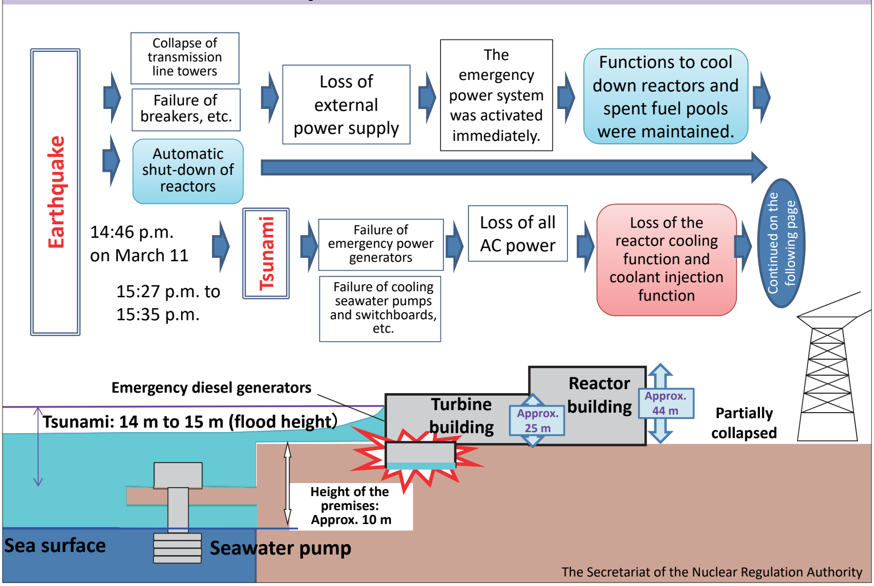
Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS Unit 3 (shot from the air)
(Shot on March 16, 2011; Provided by TEPCO)

Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS Unit 1, Unit 2 and Unit 3, which were in operation at the time of the earthquake, lost all AC power due to the earthquake and subsequent tsunami. This led to the stop of the cooling system and loss of means to cool down nuclear fuels, eventually resulting in the melt of nuclear fuel. In the process of the melt, a large amount of hydrogen gas was generated and hydrogen gas accumulated in reactor buildings caused an explosion at Unit 1 on March 12 and at Unit 3 on March 14. Additionally, at Unit 4 adjacent to Unit 3, a hydrogen explosion occurred due to hydrogen gas that is considered to have flowed into it from Unit 3.

Included in this reference material on March 31, 2013

Fukushima Daiichi Nuclear Power Station (NPS) Accident

Factors of the Accident: (Estimated) Influence of the Earthquake and Tsunami



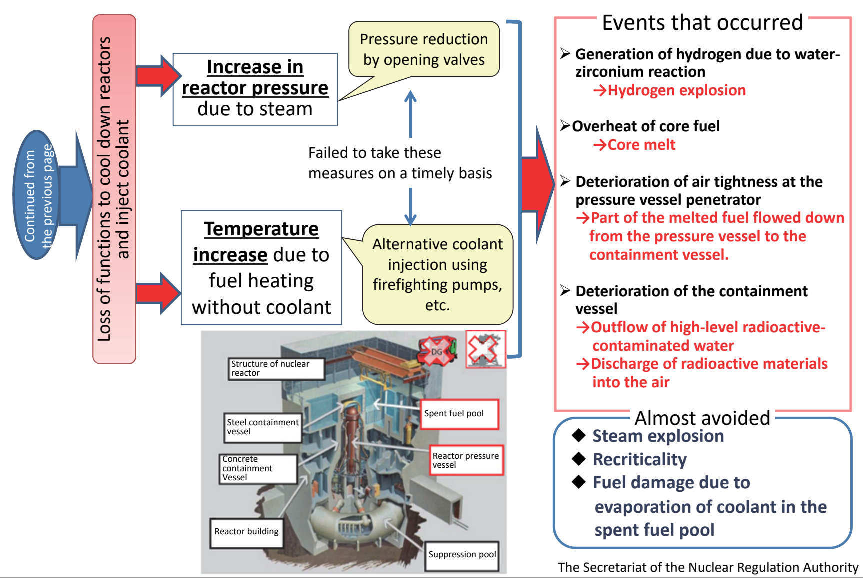
Immediately after the earthquake, at Unit 1, Unit 2 and Unit 3 at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS, which were in operation, all reactors were shut down automatically. As external electrical power supply was lost due to the collapse of transmission line towers, etc., emergency diesel generators were automatically activated. However, the tsunami hit the NPS and flooded those emergency diesel generators, switchboards and other equipment. All Units except for Unit 6 lost all AC power and cooling seawater pumps stopped functioning. As a result, Unit 1 lost all functions to cool down the reactor. Unit 2 and Unit 3 continued cooling reactors for some time using the Reactor Core Isolation Cooling System (RCIC) and the High Pressure Coolant Injection System (HPCI), respectively, which can work without AC power. However, these systems also stopped soon.

Under such circumstances, NPS staff worked to shift to alternative coolant injection using fire pumps or other equipment at Unit 1, Unit 2 and Unit 3, but until those alternative measures were commenced, reactor cores were left uncooled. Coolant injection is considered to have been suspended for around 14 hours at Unit 1 and for around 6.5 hours at Unit 2 and Unit 3.

Included in this reference material on March 31, 2013

Fukushima Daiichi Nuclear Power Station (NPS) Accident

Factors of the Accident: (Estimated) Status within the Reactor



As coolant injection to the reactor core was suspended, the water level in the reactor declined and the fuel was exposed. This caused core melt and damaged the pressure vessel. Additionally, under high temperature due to core damage, steam and zirconium of the fuel clad reacted to generate a large amount of hydrogen, which was released within the containment vessel together with steam.

In the meantime, core damage increased the temperature and pressure in the containment vessel and deteriorated its confinement function, causing gaps in such parts as the penetrator that extends to the outside of the containment vessel. Hydrogen generated due to the reaction of the steam and metal of the clad covering nuclear fuel leaked through the gaps into the reactor building and accumulated there. It led to a hydrogen explosion.

Coolant injected into the reactor leaked from the pressure vessel and containment vessel and a large amount of high-level radioactive-contaminated water accumulated underground below the reactor building and turbine building and partially flowed out into the ocean.

The damage to the pressure vessel and deterioration of the confinement function of the containment vessel caused a leak of steam containing radioactive materials. In addition, radioactive materials were discharged into the air due to hydrogen explosions at the reactor buildings and containment vessel vent operations.

In this manner, radioactive materials were released into the environment in the form of outflow of high-level contaminated water into the ocean and discharge of radioactive materials into the air.

Included in this reference material on March 31, 2013
Updated on January 18, 2016