

# TEPCO's Nuclear Power Plants suffered from big earth quake of March 11,2011

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# The big earth quake

- Attached northern part of Japan at 2:46pm of March 11, 2011.
- Magnitude is 9 in Richter scale. The biggest in history.
- Some earth quakes occurred along the boundary of plates. Hundreds of km of the boundary moved, similar to the big earth quake in Indonesia.
- Big Tsunami (10m) attacked northern Japan and NPP. It was bigger than expected.
- There is no damage in the central Tokyo.
- Power plants including gas and coal fired ones were automatically shut down. NPPs were also automatically shut down.

# Fukushima site 1 (1F)

- 6 units , Unit #1, #3 and #2 in trouble. Unit #1: 460MWe BWR ,Unit #3,#2: 768MWe BWR
- 2:46pm March 11: The earth quake happened. Plants automatically shut down. Offsite power lost. Emergency DG started up.
- 3:41pm Emergency DG stopped due to loss of equipment cooling water. (Tsunami was bigger than expected.) **All AC power was lost** and consequential isolation from UHS, except for IC (isolation cooling system) in 1F1. RCIC in 1F **2 Blackout + (mostly) loss of UHS**
- RCIC was available to makeup water in the initial stage.
- SAM (Severe Accident Management) prepared in the 90's in place such as containment scrubbing venting, supply of water from portable water tank using Fire Protection pump or Fire Engine and inter-connection of power supply with other units.
- Site emergency announced. (After JCO accident, emergency law was settled. It requires report to the central government.) Evacuation up to 20km around 1F, 10km around 2F.

# Summary of Site #1, Unit 1 and 3

- Loss of All AC power.
- Partial core uncover (1-2m) occurred.
- Hydrogen generated by Zr-water reaction
- CV pressure increased and CVs were vented to maintain the integrity.
- Hydrogen detonation occurred in the upper part of the reactor buildings (unit 1 on March 12 and unit 2 on March 14). 14 workers injured.
- Area evacuated in 20km.
- **Radiation levels are low**, 1mSv/h highest at the site. (Dose limit of public: 1mSv/y)
- Sea water with boric acid injected into RPV and CV.
- CV integrity is maintained. **Large release will be not likely.**
- Cores are covered by water now.
- Level 4 accident of IAEA.

# Fukushima site #1 Unit 2 (1F2)

- Loss of all AC power.
- RCIC was in operation but is now lost.
- Low water level in RPV and High CV pressure continue. Mobile power supply was tried but not working well.
- Seawater injection were conducted.
- **Fuels were fully uncovered by water for 2 hours** due to the lack of fuel (oil) of the pump injecting the sea water. Fuel is covered about up to 2m now (will be fully covered eventually).
- The reactor building wall was partly removed, not to accumulate the hydrogen at CV vent. **There is no risk of hydrogen detonation.**
- Depressurization of RPV, CV venting will be taken.

# Fukushima site # 2 (2F)

10-20km from site #1

- 4 units: 1100 MWeBWR
- Sea water pumps of unit 1,2 and 4 did not work due to Tsunami. The motors were being replaced unit by unit. Recovery of the cooling were successful for unit 1 at 3am and for unit 2 at 7am of March 14.

Thank you