【Reference】

November 24, 2011
Tokyo Electric Power Company

Hydrogen concentration management for reactor pressure vessel in Unit 1 to 3 at Fukushima Daiichi Nuclear Power Station

1. Sequence of the events
   - Gas control facility for primary containment vessel （Gas control facility）in Unit 2 began operation at 6:00 pm on October 28. Since then, hydrogen concentration inside the primary containment vessel is continuously monitored by the facility.
   - Immediately after gas control system started, hydrogen concentration was 0.9％. However, it started to increase gradually (2.9% at maximum). Therefore, amount of extraction was increased by nitrogen injection and gas control facility. As the result, hydrogen concentration gradually decreased and it is now stable (0.7%).
   - The cause of this is assumed to be the extraction of hydrogen from upper part of primary containment vessel and reactor pressure vessel by gas control facility.

2. Condition of reactor pressure vessel
   - In order to remove decay heat from reactor pressure vessel, water injection has been conducted. （Unit 1: Approx.5.5m^3/hr, Unit2/3: Approx.10m^3/hr）. Because water level is not sufficient in reactor pressure vessel, it is assumed that there is leakage from reactor pressure vessel to primary containment vessel. Therefore, the effect of nitrogen injection to primary containment vessel is assumed to be reaching reactor pressure vessel as well.
   - On the other hand, relatively high concentration of hydrogen was detected when gas control facility in Unit 2 was started. This may be due to the insufficient amount of nitrogen in the primary containment vessel and gas control facility extracted relatively high concentration of hydrogen inside the reactor pressure vessel.

3. **Hy**drogen concentration management for reactor pressure vessel
   - There is possibility that relatively high concentration of hydrogen exist in reactor pressure vessel. Therefore, nitrogen will be directly injected to reactor pressure vessel to manage the hydrogen concentration maintains below inflammable limit even in the condition without steam.
   - Nitrogen injection to the reactor pressure vessel requires time for construction preparation. To be sure, until the nitrogen injection to reactor pressure vessel begins, steam ratio in the reactor pressure vessel will be increased to

decrease hydrogen concentration. The implementation will begin on November 24.

- Following the implementation, it is expected that relatively high concentration of hydrogen inside reactor pressure vessel may pushed out to primary containment vessel. Therefore, the amount of nitrogen injection for Unit 3 will be increased from 14Nm^3/h to 28Nm^3/h at the same time since the injection amount for Unit 3 is small compared to Unit 1 and 2,
- As for the water injection from cooling system in Unit 1 which was planned on November 25, it will be started following the start of nitrogen injection to the reactor pressure vessel.

End