Evaluation of the Report on the Installation Implemented to be for Circulation Cooling Systems of Units 1 and 4 at Fukushima Dai-ichi Nuclear Power Station

Confirmation and evaluation were made as below on the report submitted by TEPCO:

(1) Effectiveness of the circulation cooling system

Maintaining spent fuel pool water at a suitable temperature enables to prevent release of steam containing radioactive substances from the pool as well as deterioration of concrete. It also enables to prevent the deterioration of the environment inside the Unit 1 reactor building due to the installation of a reactor building cover.

The ability to maintain the water level as well as temperature in the spent fuel pool secures a longer window for alternative measures in the event of loss of cooling function, with a longer term from the a state that pool water is kept below the management temperature (65°C) to a state that the pool water evaporates and drops to the level of the top of active fuel (Assessment related to fuel pool water level concludes that Unit 1 pool takes over 86.1 days to go from a full level of a pool to the level of a top of active fuel, and for Unit 4, the duration is over 17.6 days).

(2) Safety Assessment

1) Structural integrity and seismic safety of the equipment comprised in the circulation cooling system

While structural integrity meets the requirements of safety examination guidelines, it is difficult to verify strict compliance with some of the requirements related to seismic safety. For this reason, measures #3, 4 and 6 below have been put in place, assuming a potential for equipment damage due to earthquakes.

2) Cooling ability for the circulation cooling system

The system possesses sufficient cooling capability (meets the requirement of the operational safety programs: maintaining the
temperature below 65°C) in terms of the current spent fuel decay heat.

3) Preventive measures against coolant leakage from the circulation cooling system

Unit 1

Leak tests has been conducted on the heat exchanger, pumps and piping on existing fuel pool cooling and clean-up system, and its integrity verified. In addition, even in the event of coolant leakage, there would be no leakage outside the reactor building given that these primary systems are installed within the reactor building.

Units 4

Leakage from the heat exchanger, pumps and piping to be installed in a primary system would be detected as a difference in flow rate, and lead to automatic shutdown/shutoff of pumps and valves. In addition, even in the event of coolant leakage, there are measures to contain the contamination through construction of dams and other barriers high enough to capture the leak amount, inside the buildings (reactor building as well as the radioactive waste treatment facilities).

4) Measures in the event of loss of circulation cooling system function.

If the circulation cooling system were to lose its function, the cooling function would revert to the provisional pump cooling, which is currently in use and would be maintained even after system installation. If the loss of function were due to a tsunami, the alternate measure is water injection from the fire engines, which are on standby onsite.

5) Radiological protection measures

There are measures in place to keep exposure as low as possible, such as shortening on-site installation time by integrating system components, and enabling remote operation of the system.

6) Operational and maintenance management for the circulation cooling system

The operational status of systems (water level, temperature, flow rate, etc.) is observed through monitors in the Seismic Isolated Building,
and the system can be remotely shut down in an emergency, if necessary. Moreover, a manual is being created outlining a response to unusual events.