

## Study on Tsunami Behaviors and Countermeasures at a Site of Nuclear Power Plant

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Many catastrophic tsunamis have been occurred in the East Sea, and big tsunamis expected from the seismic gaps along the eastern margin of the East Sea. In Korea, all nuclear power plants are located along the coastline and more nuclear power plants are planned to be constructed. These nuclear power plants are vulnerable to sudden tsunamis.

The 2004 Indian Ocean tsunami attacked not only the coast of Indonesia and Thailand, closed to the source of earthquake, but also the coast of India, Sri Lanka, the Maldives, and even the east coast of Africa, about several thousand kilometers away from the epicenter. This tsunami raised the water level in the seawater pump house of the Madras nuclear power plant at Kalpakkam city of Tamil Nadu state in India had result in tripping of condenser cooling water pumps. Subsequently, the reactor was brought to cold shutdown state by follow-up emergency operating procedure.

The objectives of present study are to evaluate the design tsunami and to propose the general countermeasures on safety standards and emergency procedures against tsunamis at a site of nuclear power plant in Korea.

This study suggests a new method for evaluation of design tsunami, which can be utilized for the design of nuclear power plant for distant tsunamis. With this method, object tsunamis are sampled by consideration of historical tsunamis and seismo-tectonics along the eastern margin of the East Sea. Fault parameters of object tsunamis are selected by consideration of possible maximum magnitude of earthquake and occurrence probability of each tsunami. Numerical models based on the linear Boussinesq equations and the nonlinear shallow-water equations are employed. The design tsunami has been obtained from the parametric study on the fault parameters of object tsunamis.

Also the safety of nuclear power plant on inundation of site, operability of cooling water pump, blockage of intake channel, and stability of breakwater are evaluated against the design tsunami. The results of numerical simulation are compared with the effects of nuclear facilities at Kalpakkam site by the 2004 Indian Ocean tsunami.

As a result of this review, a new design method for nuclear facilities on the

point of taking cooling water, and counterplans for operation of nuclear power plant and protection of surrounding area against tsunamis are suggested.

As a future plan, it is required to predict reasonably possible maximum tsunami at source area, and probabilistic approaches on tsunami hazard.

