Consideration on Radiation Shielding Safety Review of High Density Storage Racks Additionally Installed in Spent Fuel Pool

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Nowadays spent fuel pools in nuclear power plants are designed with high density storage racks to accommodate high capacity of spent fuels. Recently in Korea, an application to install additional installation of high density storage racks in spent fuel pool in a nuclear power plant was reviewed for various fields such as criticality safety, structural safety, seismic safety, thermal hydraulic safety, accident analysis, and radiation shielding safety. This study focuses on drawing specific consideration on the radiation shielding safety review among the various safety review fields.

To review the shielding safety for the case of additional installation of high density storage racks into an existing spent fuel pool, a safety review framework was implemented and various review items were identified. The core review item is the shielding capability of the cooling water of spent fuel pools. Its shielding capability is translated into the limitation of surface dose rates. To review the agreement of the surface dose rates with the upper limit, additional inquiries are required for the detailed information utilized to evaluate the surface dose rates. And if necessary, confirmatory calculation is performed by using different approach to evaluate the surface dose rates. In addition, whether radiation zoning and shielding source terms around the spent fuel pool are affected or not due to the increased spent fuels in the pool should be re-checked via additional inquiries.

In this study, consideration is drawn on a review framework and review items necessary to assess the radiation shielding safety of high density storage racks. It is expected this consideration can be helpful to standardize the shielding safety review activities until the fully-developed safety review guide is prepared.

Keywords: High Density Storage Racks, Spent Fuel Pool, Radiation Shielding Safety