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Pool Fire Tests of Dual Purpose Casks for Spent Nuclear Fuel

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Abstract : Dual purpose casks are used for storage and transport of spent nuclear fuel assemblies. Therefore, they satisfy the requirements prescribed in the Korea NSSC Act 2013-27, the IAEA Safety Standard Series No. SSR-6, and US 10 CFR Part 71. These regulatory guidelines classify the dual purpose cask as a Type B package, and state that a Type B package must be able to withstand a temperature of 800°C for a period of 30 min. Therefore, a fire test was conducted using a one-sixth slice of a real cask to estimate the thermal integrity of the dual purpose cask at a temperature of 800°C. The neutron shield reached a maximum temperature of 183°C, which indicates that dual purpose cask was properly insulated from the heat of the flames. The temperature rise of the basket during the fire test was 29°C. Therefore, the integrity of a spent nuclear fuel is estimated to be maintained. The temperature was lower when a cooling pin was installed. The neutron shielding was therefore protected adequately by cooling pin. As a result, the thermal integrity of the dual purpose cask was maintained and the cask is judged to be sufficiently safe for temperatures under 800°C.

Keywords : dual purpose cask, spent nuclear fuel, pool fire test, integrity
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