



## Corrosion Characteristics about spent fuel storage steel cask on Korea onshore environment

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Spent fuel of nuclear power plant should be storage intermediate dry steel cask before permanent disposal at a mined repository or geological disposal facility. Purpose of this study is to help establish the technical basis for extended long-term storage and subsequent transportation of used fuel, which may occur multiple times before final disposal. Dry storage cask for spent fuel consists of several metals such as stainless steel, low alloyed carbon steel. It should be undergo several materials degradation such as corrosion behavior because it will be settled at waterfront area in Republic of Korea. Regard to coastal area in storage environment, several corrosion behavior, such as crevice, SCC, general, and weld corrosion, should be issued. Figure 1 shows schematic diagram for estimated corrosion behavior in dry storage cask.

To corrosion test after  $\gamma$ -ray irradiation, total  $\gamma$ -ray amount was calculated using spent fuel 24 units. Target fuels were settled as burn-up 45,000MWD, cooling times 10 years. Also, gamma-ray was estimated about 80% through fission products. We tested gamma-ray irradiation by Co-60 irradiation methods using calculated gamma-ray dose amounts. Tensile, impact and corrosion test samples were used for gamma-ray irradiation test. Tensile test showed almost same results after  $\gamma$ -ray irradiation test. However, Cold impact test showed energy decreasing after  $\gamma$ -ray irradiation. It was estimated that  $\gamma$ -ray effected the metal structure degradation(refer table 1).

Corrosion behavior of several steel samples(LF3 was low alloyed carbon steel(used for cask body materials), and Al & Ni was plated on LF3 substrates) were compared with their corrosion weight loss, based on ISO 14993 test method(atmospheric accelerated corrosion test), after  $\gamma$ -ray irradiation. It was also showed corrosion rate increasing after  $\gamma$ -ray irradiation and it was estimated as intergranular corrosion increasing(refer Fig. 2). On the other hand, plated samples showed extremely low corrosion rates compared with steel materials. Henceforth, dry storage cask should be managed using gamma-ray affect.

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