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Safety Assessment of Interim Disposal Facility in King Fahd University for Petroleum and Minerals (KFUPM) Area for Interim Storage of Low- and Intermediate-level Radioactive waste (LILW)

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At King Fahd University of Petroleum and Minerals (KFUPM), the radiological safety of a proposed shallow-land repository—projected to be reinforced-concrete vaults measuring 24 m × 18 m × 9 m for low- and intermediate-level radioactive waste (LILW)—was evaluated with the RESRAD-OFFSITE v4.0 code alongside specific hydrogeological, geochemical, and lifestyle information. The inventory was obtained from the Gyeongju LILW facility in South Korea and was adjusted to the estimated waste volume at KFUPM. The dose constraint adopted for compliance was 0.1 mSv/year, as recommended by IAEA for the individual exposed maximally. Baseline calculations predict the single dose maximum of approximately 11,000 years will be 9×10^{-4} mSv/year, dominated by the activation product Ni-59. This peak only represents 0.9% of the regulatory limit. Bounding sensitivity tests, produced by multiplying every release fraction uniformly by 0.1 and 10, yielded peak doses of 1×10^{-6} mSv/year and 3×10^{-3} mSv/year respectively, both remaining safely below the compliance limit of 0.1 mSv/year. The region near the closure has short-lived Co-60 and Co-58 dominating contribution, with Ni-59, Nb-94, and Pu-239 taking over after 90,000 years. This concludes that the repository does not exceed the exposure criteria set under normal conditions, which plus other best case scenario uncertainties would make him more comfortable against captivity for solubility, sorption, and release fraction, remains stable against plausible uncertainties in disposition. The study justifies the acute radio-toxicity surveillance in the facility disaster program while also showing the South Korea policy can be used in foreign regions.

Technical Track

Fuel Cycle and Waste Management

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