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Development of a Procedure for Assessing Exposure Dose in Landfill Disposal of Processed Products Containing NORM

Abstract—Concerns for processed products containing NORM have been raised with the recent issue of some processed products containing Naturally Occurring Radioactive Material (NORM) in Korea. The treatment and disposal of processed products containing NORM may result in radiation exposure. Major processes that cause exposure during treatment and disposal include landfill, incineration, and transport. However, the methodology for radiation dose assessment of treatment and disposal for the NORM has not been clearly established in Korea. In this study, we developed the procedure for assessing exposure dose for landfill of processed products containing NORM. Exposure dose from landfill can be assessed using resrad-on-site computer program. The resrad-on-site can assess the exposure dose to workers and residents due to radioactive materials present in soil. The input parameters considered in the computer program include source term, calculation time, landfill site, contaminated layer, saturated layer, unsaturated layer, exposure information, ingestion information, and storage time. For source terms, the nuclides considered in this study are NORM materials. Therefore, they can be set as uranium series, thorium decay series, K-40 etc. The calculation time can be set for 1,000 years according to the notice of the National Nuclear Safety and Security Commission. For landfill information, it can be evaluated by setting information corresponding to the landfill site specific data which is a factor that determines the area and thickness of the landfill site. For information of contaminated, saturated, and unsaturated layers under the landfill site, the information corresponding to landfill site specific data can be used. For exposure information, which are related to the occupancy ratio, breathing rate, and shielding factor, the values that reflect domestic conditions can be used. For intake information, including ingestion rate, livestock consumption rate, and food contamination proportion, domestic conditions can be used. The storage time is a factor that determines the time it takes to harvest and consume food. The aforementioned variables can be used to assess the exposure dose appropriate to domestic conditions. The results of this study are expected to contribute to the establishment of a methodology for radiation dose assessment for defective processed products containing NORM in Korea. * This work was supported by a grant from “Establishment of Technical Basis for Measurement and Assessment for Radiation in the Natural Environment and Resulting Radiation Impact” carried out by KINS.

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