

Preliminary Evaluation of Decommissioning Wastes for the First Commercial Nuclear Power Reactor in South Korea

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Abstract : The commercial nuclear power reactor in South Korea, Kori Unit 1, which was a 587 MWe pressurized water reactor that started operation since 1978, was permanently shut down in June 2017 without an additional operating license extension. The Kori 1 Unit is scheduled to become the nuclear power unit to enter the decommissioning phase. In this study, the preliminary evaluation of the decommissioning wastes for the Kori Unit 1 was performed based on the following series of process: firstly, the plant inventory is investigated based on various documents (i.e., equipment/ component list, construction records, general arrangement drawings). Secondly, the radiological conditions of systems, structures and components (SSCs) are established to estimate the amount of radioactive waste by waste classification. Third, the waste management strategies for Kori Unit 1 including waste packaging are established. Forth, selection of the proper decontamination and dismantling (D&D) technologies is made considering the various factors. Finally, the amount of decommissioning waste by classification for Kori 1 is estimated using the DeCAT program, which was developed by KEPCO-E&C for a decommissioning cost estimation. The preliminary evaluation results have shown that the expected amounts of decommissioning wastes were less than about 2% and 8% of the total wastes generated (i.e., sum of clean wastes and radwastes) before/after waste processing, respectively, and it was found that the majority of contaminated material was carbon or alloy steel and stainless steel. In addition, within the range of availability of information, the results of the evaluation were compared with the results from the various decommissioning experiences data or international/national decommissioning study. The comparison results have shown that the radioactive waste amount from Kori Unit 1 decommissioning were much less than those from the plants decommissioned in U.S. and were comparable to those from the plants in Europe. This result comes from the difference of disposal cost and clearance criteria (i.e., free release level) between U.S. and non-U.S. The preliminary evaluation performed using the methodology established in this study will be useful as a important information in establishing the decommissioning planning for the decommissioning schedule and waste management strategy establishment including the transportation, packaging, handling, and disposal of radioactive wastes.

Keywords : characterization, classification, decommissioning, decontamination and dismantling, Kori 1, radioactive waste

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