

A Study on the Conceptual Design of Package for the RV/RVI Cutting Wastes During Decommissioning of Kori Unit-1 NPP

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1. Introduction

Recently, a R&D project has been conducted for segmentation of RV/RVI and packaging technology of those radioactive wastes to prepare for the upcoming issue regarding decommissioning of Kori-1 NPP. The main issue for the decommissioning of Kori-1 NPP is the management of RV/RVI which is categorized as a LLW/VLLW. In addition, the design of RV/RVI cutting waste packaging container should meet the safety requirements for transportation, storage and disposal as well as WAC (Waste Acceptance Criteria) for the repository at Kyeongju [1].

In this paper, the concept of the design for the RV/RVI cutting waste package of Kori-1 NPP is presented.

2. Consideration

2.1 Domestic radioactive waste management

The process of wastes from operation and maintenance in Republic of Korea is packaging the radioactive waste in standard steel 200 or 320 L drums. For instances, 8 drums (200 L) were loaded on the IP-2 type transport container (8 drums per one container) and transported to LILW repository at Kyeongju(silo type facility).

The used transportation containers can be reused after unloading the drums, and those drums are repacked and disposed of in the concrete disposal container (16 drums per one container).

2.2 Waste characteristics

In case of RV/RVI waste of Kori unit 1, approximately 66 tons of ILW and 128 tons of LLW and VLLW are expected to be generated during the future decommissioning activity.

Table 1. Waste classification of RV/RVI from Kori-1 NPP

COMPONENT		Total Activity [Bq]	Classification	Weight [ton]
RV		6.17E+15	LLW, VLLW	135
R V I	Upper Support Assembly	3.56E+03	VLLW	42
	Upper Core Plate	5.85E+12	LLW	
	Guide Tube	2.65E+10	VLLW	
	Upper Support Column	7.72E+10	VLLW	
	Lower Core Plate	1.21E+12	LLW	
	Core Support Assembly	1.26E+10	VLLW	66
	Thermal Shield	8.21E+15	ILW	
	Barrel	3.54E+16	ILW	
	Baffle Plate	3.06E+16	ILW	
	Baffle Former	5.85E+14	ILW	

2.3 Assumptions

2.3.1 Radioactive waste management system.

Considering the uncertainty on the stability of the management and regulatory requirements in case of the RV/RVI cutting wastes from Kori-1 NPP, it would be an effective way to make the most of the current infrastructure or to add an additional waste management system from the existing systems.

2.3.2 Packaging.

In order to minimize the number of RV/RVI cuttings, the larger the packing unit is, the more favorable it is. However, according to the KORAD's waste acceptance criteria, the maximum size of the package is less than 10 tons of concrete packages, whose size is 1.5 m (L) × 1.5 m (W) × 1.5 m (H).

2.3.3 Transportation. The package is designed to be transported by the IP-2 type container which can let us utilize the current waste handling system. This container was designed to be disposed of at the vault-type near-surface facility of phase II under construction at Kyeongju.

3. Conceptual design

The package for the RV/RVI cutting wastes for Kori unit-1 is a container for both packaging and disposal purposes, in the form of a square box-shaped steel container

The body and cover are made of carbon steel, and there is a small hole for the grouting work in the lid of the package. Also stillage which is located inside the package is used for fixing the materials inside and improved radiation shielding performance. Figure 1, 2 below shows the schematic design of the package and IP-2 including the package.

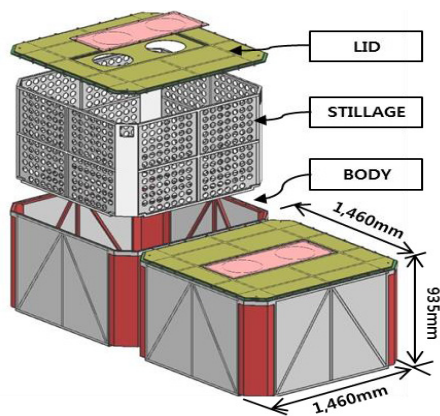


Fig. 1. Conceptual design of waste package.

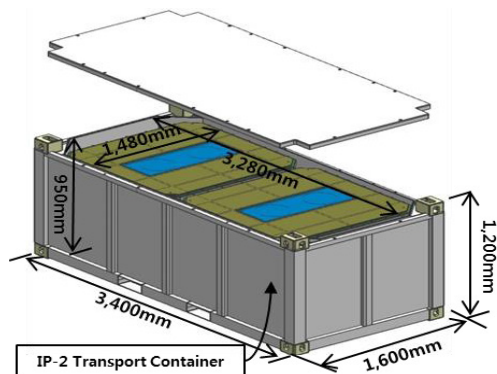


Fig. 2. Scheme of IP-2 including conceptual package.

The packages are designed to pack a maximum 5.9 tons of wastes (total package weight limit: max. 9.4 tons). (Change of the transportation container design is necessary since the transportation weight limit is 18.8 tons.) The evaluation of structural analysis of IP-2 container including the package will be conducted in the future.

4. Conclusion

The conceptual design of the package for the management of RV/RVI wastes from Kori-1 NPP was presented. This conceptual package was designed considering the compatibility with the current domestic radioactive waste management system and the near-surface disposal facility at Kyeongju.

ACKNOWLEDGEMENT

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