

Radioactive Waste Treatment for Release of Korea Research Reactor Site

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1. Introduction

Release project for KRR site was restarted in earnest from 2016 to 2021. Preparation works for release of KRR (Korea Research Reactor) were conducted by Sunkwang T&S from July, 2016 to May, 2017. The KRR site will be used for non-nuclear purpose (green field) after site release.

Although radioactive waste was satisfied the clearance criteria when it generated but now the regulation guide for clearance was revised in 2014[1], and as a result the radioactive waste in KRR didn't meet the clearance criteria any more.

So extra works, such as, taking representative sample, activity analysis, repacking, crushing and cutting for clearance were performed.

2. Preparation Works

2.1 Collecting of Representative Sample

Because the regulator generally want to(requires to) submit the latest analysis data, within two years, the validity of activity analysis data for radioactive waste in KRR site has already been expired. Therefore extra sampling was conducted to secure the representative sample.

2.1.1 Concrete and Soil. To take sample and classify the radioactive waste, Semi-automatic classification working table was manufactured.



Fig. 1. Classification Working Table.

Table 1. Specification of Classification Working Table

Item	Spec.	
Max. Intake weight	500 kg/each	
Classification table	No. 2	
	Size [cm]	200 × 100 × 20 [L × W × H]
	Operation unit	Electric Hoist

After unloading the concrete and soil waste on classification table by forklift, then waste was divided by 10 zones for scan survey. Based on the scan survey result, representative sample was collected intensively at the zone that contaminated more than other zones slightly or highly.

2.1.2 Metal. Punching and drilling were applied to collecting representative sample of metal waste. An Object metal was divided four zones that were surveyed in the same manner as the concrete and soil.

Chips generated from the zone, gathered as a sample of metal. If the thickness of metal is thinner than 10 mm the punching was applied, if not the drilling was applied.



Fig. 2. Punching and Drilling of Metal.

2.2 Gamma analysis

Gamma analysis of representative sample was performed with gamma spectroscopy.[2] The conditions of analysis are as in the following.

Table 2. Conditions of gamma analysis

Conditions	Value
Analysis time	3,600 sec
Sample Geometry	1,000 ml M.B
MDA	Less than 10% of Permissible activity of nuclide*

* Notification of Nuclear Safety and Security Commission 2014-003 table 1

2.3 Repacking

Base on the result of gamma analysis, waste was classified two groups. If the ratio of gamma activity summation of nuclides are less than 0.5, applicable waste was classified as object for clearance and more than 0.5 it was classified as permanent disposal waste.

After classifying the waste, permanent disposal object was repacked to disposal container.



Fig. 3. Repacking to Disposal Container.

Every package was checked its radiation dose, radioactivity, weight, volumetric packing fraction, surface existence of free water, chelate agent, explosive material and so on.

3. Conclusion

Radioactive waste in KRR site was treated and classified from July, 2016 to May, 2017. Collecting representative sample, gamma analysis and repacking were performed and as a result 271,298 kg waste was classified totally. Classified waste has been stored in KRR 2 finally.

REFERENCES

- [1] Jong Soon Song, Dong Min Kim, Sang Heon Lee, "A Study on the Application of Standards for Clearance of Metal Waste Generated During the Decommissioning of NPP by Using the RESRAD-RECYCLE", Journal of Nuclear Fuel Cycle and Waste Technology, Vol.14, No.4, 305-320(2016).
- [2] Il Sik Kang, "Treatment of Radioactive Contaminated Soil and Concrete Wastes Using the Regulatory Clearance", KAERI/TR-3653/2008, 39.