

# Self-disposal of aluminum material radioactive waste through applying radioactive waste classification and self-disposal standards



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## Introduction

- During research reactor nuclear fuel assemblies manufacturing process, low and intermediate level aluminum radioactive waste is generated in the aluminum-clad concentric extrusion process and the CNC machining process.
- There is no concern of radioactive contamination of aluminum radioactive waste in storage. That's why we decided to reduce them through applying low and intermediate level radioactive waste classification and self-disposal standards.
- In this study, introduces the procedure and the results of self-disposal of ferrous material low and intermediate level radioactive waste.

## Method and Results

### Self-disposal target selection

- As a result of radioactive contamination analysis, radioactive wastes that are less than the allowable concentration for self-disposal have clear traceability are selected as wastes subject to self-disposal.

### Data investigation of selected self-disposal target radioactive waste

- To declare of self-disposal to KINS, waste's data such as quantity, weight, contamination category, generation period should be collected.

- Waste Data subject to self-disposal is as below.

category of radioactive waste	aluminum
generation facility	SAEBIT fuel science building 203ho
type of contamination (surface or volume contamination)	surface contamination
weight(kg)	396
main nuclide	U-235, U-238



Picture of aluminum chip and aluminum cladding which were generated during manufacturing nuclear fuel.

### Waste data

- Analysis of nuclide and contamination concentration through radioactive waste sample analysis.



Picture of selecting and weighting of aluminum chip and cladding sample

- Result of Analysis of nuclide and contamination concentration

### 1) Surface radiation dose rate

category	radiation dose rate	surface contamination concentration			
	$\beta \cdot \gamma$	$\alpha$		$\beta \cdot \gamma$	
surface	0.20 $\mu$ Sv/h	<MDA		<MDA	
1m distance	0.20 $\mu$ Sv/h	(0.0113)	Bq/cm <sup>2</sup>	(0.00628)	Bq/cm <sup>2</sup>

### 2) Radioactivity nuclide concentration of sample

sample no.	analysis sample weight(g)	nuclide	radioactivity concentration (Bq/g)	allowable concentration (Bq/g)	result
1	7.575	U-238	0.04935 ± 0.00313	1	Accept
		U-235	0.0135 ± 0.00119	1	
2	88.165	U-238	0.00200 ± 0.00205	1	Accept
		U-235	0.00104 ± 0.000150	1	

### Self-disposal plan declaration and approval

- Self-disposal plan declaration : Before self-disposal, waste generation division should declare about self-disposal plan to KINS. Waste's category, quantity, generation reason, generation period, radioactivity concentration, nuclide, method of self-disposal are included in self-disposal plan declaration.

- Self-disposal plan approval : After KINS reviews the self-disposal plan declaration, KINS approves self-disposal and requests notification of self-disposal result.

### Contamination concentration inspection

- Perform contamination concentration inspection, weight measurement before transportation from radiation controlled area to general area. Contamination concentration measurement equipment and weighing machine should be calibrated.



Picture of packing for transportation self-disposal waste.



Picture of weight measurement using calibrated weighing machine.



Picture of contamination concentration measurement



Calibration Certificate of Gamma survey meter

### Self-disposal

- Method : Aluminum materials radioactive waste's that are concerned about surface contamination self-disposal method is consignment recycling.

- Transport self-disposal waste from radiation controlled area to general area for self-disposal.

- Notify self-disposal result to KINS after self-disposal within 30 days

## Conclusions

- Low and intermediate level radioactive waste can be reduced by applying radioactive waste classification and self-disposal standards.

- The result of self-disposal is reducing low and intermediate aluminum materials radioactive waste. Through this activity, KAERI saved radioactive waste disposal cost, secure available laboratory space and conserved our nature.

- This procedure would be helpful for someone who try to reduce low and intermediate level radioactive waste in other radiation controlled area.