

# A Study on the Radiological Safety Assessment Method Establishment of Recycling Workers of Very Low Level Radiological Metallic Wastes in Decommissioning Nuclear Power Plants

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## 1. Introduction

Most metal wastes, generated during NPP decommissioning, are very low level radioactive wastes, and it seems necessary to calculate recyclability in consideration of the licensing procedure involving regulatory agencies. This study examined establishment of assessment plans prior to assessment of the radiologic stability of very low level radioactive metal wastes.

## 2. Method Establishment

### 2.1 Radionuclide Selection and Concentration

For radiologic assessment for Clearance waste, it was believed that utilization of the nuclides mentioned in foreign literature for assessment of nuclides would enhance the reliability of the result of assessment. To this end, the considered nuclides, mentioned in IAEA-TECDOC-855, NUREG-1640 and Rp-117, were compared, and nuclides were derived within the scope applicable in RESRAD-RECYCLE, and they will be used for assessment. As for the concentration of nuclides, 100 times the permissible concentration of Clearance level in Korea was considered for assessment.

### 2.2 Radionuclide Partitioning Factor

Because of the division of radioactive nuclides and the distribution of the mass of by-products, the concentration of some radioactive nuclides may be much higher than the original concentration of the waste metal in one of the by-products. For the concentration of the radioactive nuclides of the various smelting by-products, the Radionuclide Partitioning Factor value, mentioned in the Radiation Protect 89 and 117 report, was used.

### 2.3 Mass Partitioning Factor

As the induction furnace is used for melting in this study, it is necessary to modify the dust and slag contents. Ingot (78.5%) - slag (1.5%) - dust (20%) were applied as fixed values.

Type of furnace	Kg dust /tonne of steel	Kg slag /tonne of steel
Electric furnace	15	140
Induction furnace	1.5	20
Oxygen blast furnace	15	90

## 2.4 Recycling Scenario

Recycled metal wastes can be classified into the construction materials of nuclear facilities, containers for radioactive wastes, materials for disposal of radioactive wastes and radiation shield materials, and the detailed scenario is as shown in Table 1.

Table 1. Recycling Scenarios

Recycling Scenario	note
Nuclear Facility Construction Material	- Reinforcement concrete of spent nuclear fuel storage facilities - Reinforced concrete at the disposal facility on the near-surface
Radioactive Waste Container	- Drum. - Disposal containers (steel and carbon steel casting containers) - Packing container - Disposal containers of SNF copper - Aluminium storage container for HLW
Radioactive Waste Disposal Material	- Disposal container filled (metallic aggregate, wire mesh)
Radiation Shielding Material	- Fixed shielding walls (radiation source shield reinforcement) - Radioactive waste transport shielding

### 3. Selection of Evaluation Code

Among the metal wastes, generated during the decommissioning of an NPP, to know that the regulatory requirements for Clearance level of the very low level radioactive wastes in SG are satisfied, the assessment tool (RESRAD-RECYCLE Code) was selected, and this study will evaluate whether the permissible concentration of workers and the permissible dose are satisfied.

## 4. Conclusion

This study investigated methods fit for domestic conditions and conducted analysis to assess the exposure dose of workers who recycle metal wastes, generated during the decommissioning of an NPP. Assessment results (individual doses and collective doses) will be derived, and the sensitivity analysis of input variables will be conducted in the future.

## REFERENCES

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