

KNF-
WASTE-01

Melting Decontamination for Radioactive Metal Waste

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Decontamination & clearance technology for the radioactive metal waste which is difficult to be decontaminated or measured because of its complex shape

Description

● Purpose

- Volume reduction, decontamination & clearance for radioactive metal waste
 - ※ Self disposal : If the concentration per nuclide in the radioactive waste is less than the permissible self disposal limit, it's managed by incineration, landfill, recycling, etc. as a non-radioactive waste.

● Background and Necessity

- Treatment technology for radioactive metal waste that cannot be decontaminated or measured is needed to be developed.
- Countermeasure against the increasing radioactive metal waste volume
- Limited radioactive waste storage capacity
- Financial burden due to the continuous increasing radioactive waste disposal fee
- Public attention to safety regarding the radioactive waste

● Principle

- Radioactive material in molten metal tends to migrate to the slag
- Radioactive material can be separated from the molten metal by removing slag



< Wastes before Decon >

< Melting Decon >

< Ingots after Decon >

Nuclide	Radioactivity distribution after decontamination		
	Ingot	Slag	Dust
U-238, U-235	1 %	98 %	1 %
Th-232, Th-234	< 1 %	> 98 %	1 %
Ra-226, Ra-228	-	98 %	2 %
Pb-210	-	7 %	93 %

Technology Readiness Level (TRL)

Actual system proven through operation

Business Model

- Technology Transfer
- Licensing**
- Joint Search
- Service Execution**
- Others

● Object

- Nuclide : U-238, U-235, Th-232, Th-234, Ra-226, Ra-228, Pb-210, etc.
- Material : Carbon Steel, Stainless Steel, Aluminium
- Radioactivity distribution after decontamination(Markus Hamm,1999)

- Pouring molten metal into the molds
- Cooling ingots
- Measuring radioactivity of ingots
- Carrying out ingots

● System Configuration

- High frequency oscillator : Generate high frequency and supply it to furnace to heat the metal
- Melting furnace : Heat the metal
- Cooler : Cool the heat from furnace, cables, oscillator, etc.
- Dust collector : Remove dusts while working

Distinctiveness

● Characteristics

- Decontaminate the radioactive metal waste to a certain level that is self-disposable
- Decrease the volume for easier handling

● Benefits

- Reduce radioactive waste disposal fee
- Enhance radioactive waste management safety



< High frequency oscillator >



< Melting furnace >



< Cooler >



< Dust collector >

Experience

- Clearance of radioactive metal waste of KNF since 2011
- Decontamination and clearance of metal 400 drums per year

Deliverables

- Melting decontamination process
 - Facility design, Installation and Operation
 - Radioactivity analysis, Licensing support
- Operation experience, Education and Consultation

● Process

- Charging metal wastes into the furnace
- Heating metal wastes and melting
- Decontamination by removing the molten metal slag