

Radioactive Waste Solidification

RADIATION & ENVIRONMENT DEPT.

JeongWoo Lee
T. 042-868-3079
E. jungwoo@knfc.co.kr

Apply this technology to meet a waste physical disposal suitability when delivering a dispersed radioactive waste to the repository. This technique minimizes an increase of volume caused by solidification process with the purpose of reducing the disposal cost.

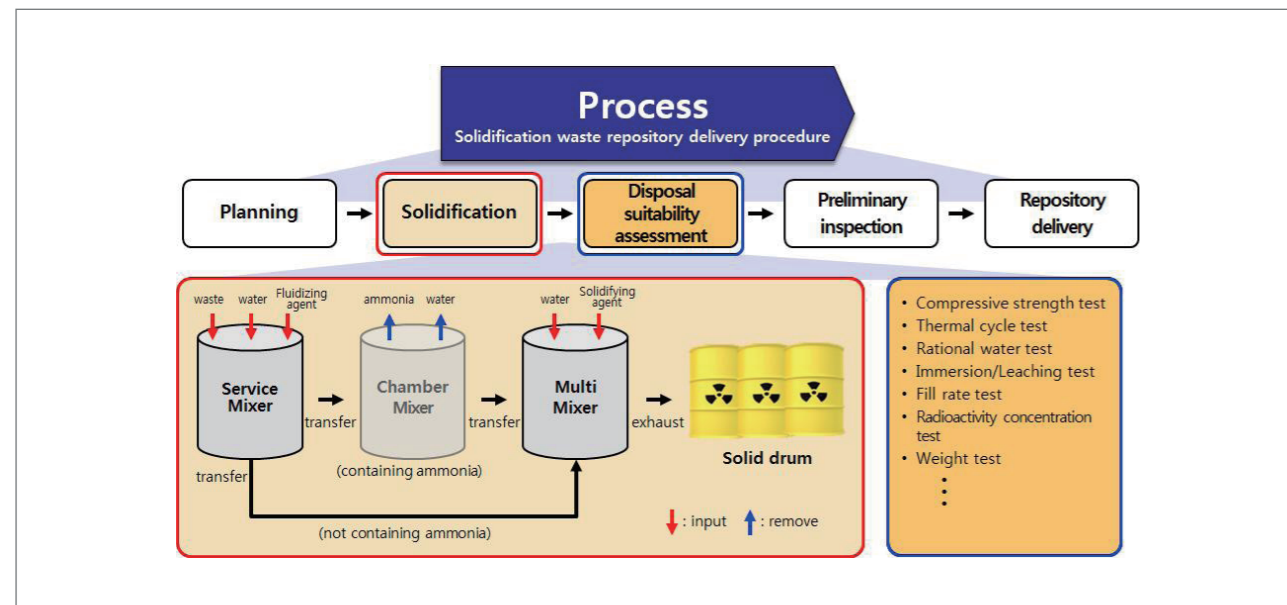
Description

* Background

- Disposable radioactive waste should not be dispersed while being delivered to the repository
- Solidification work is prerequisite for a homogeneous waste (concentrated waste liquid, waste water, sludge, etc.)

* Purpose

- To minimize the volume increase during solidification of disposable radioactive waste to satisfy the disposal suitability for delivery to the repository.



* Necessity

- Solidification technology is needed to minimize the increase of volume according to the continuous increase of waste management cost

* Overview

- Service Mixer : Mixing step of waste, water and fluidizing agent to secure waste fluidity
- Chamber Mixer : Removing ammonia from a ammonia-containing waste
- Multi Mixer : Mixing step of waste with solidifying agent
- Disposal suitability evaluation criteria

* Disposal suitability evaluation criteria

Item	Contents
Nuclied analysis and concentration	<ul style="list-style-type: none"> • Identify more than 95% of total radionuclides • Disposal concentration limit : $3.70E + 3Bq/g(\text{gross } \alpha)$
Waste content	<ul style="list-style-type: none"> • Actual waste and marking contents (including foreign matter)
Fill rate	<ul style="list-style-type: none"> • More than 85% of the volume inside the container
Rational water rate	<ul style="list-style-type: none"> • Less than 0.5% of waste volume
Structural integrity of solid objects	<ul style="list-style-type: none"> • Compressive strength (more than 3.44 MPa, 500 psig) • Satisfies the compressive strength criteria after performing the thermal cycling and leaching test
Chelating agent content	<ul style="list-style-type: none"> • Specified chemical name and abundance when containing 0.1% or more • Solidification More than 1% • No disposal of more than 8%
Surface contamination	<ul style="list-style-type: none"> • $0.4 Bq/cm^2(\alpha), 4 Bq/cm^2(\beta, \gamma)$
Weight	<ul style="list-style-type: none"> • steel drum package Less than 1 ton

* Radioactive nuclear disposal level limit

- Radionuclides concentration in waste packaging shall not exceed the following limits.

Nuclide	Disposal concentration limit(Bq/g)
H-3	1.11E+6
C-14	2.22E+5
Co-60	3.70E+7
Ni-59	7.40E+4
Ni-63	1.11E+7
Sr-90	7.40E+4
Nb-94	1.11E+2
Tc-99	1.11E+3
I-129	3.70E+1
Cs-137	1.11E+6
Gross α	3.70E+3

Distinctiveness

* Characteristics

- Developed the technology to minimize an increase of volume compared with the conventional portland cement based on solidification technology and register a domestic patent.
- Reduced the volume increase compared to the existing solidification technology : 100% \rightarrow 20%

* Benefits

- Save the management cost by reducing the radioactive waste volume

Experience

- Commercial phase for KNF lime sludge deposits

Deliverables

- Service and patent license

TECHNOLOGY READINESS LEVEL(TRL)

- Actual system proven through operation

BUSINESS MODEL

Technology Transfer

Licensing

Joint search

Service Execution

Others