

KNF-
ENG-08

Criticality Analysis for Radioactive Facility

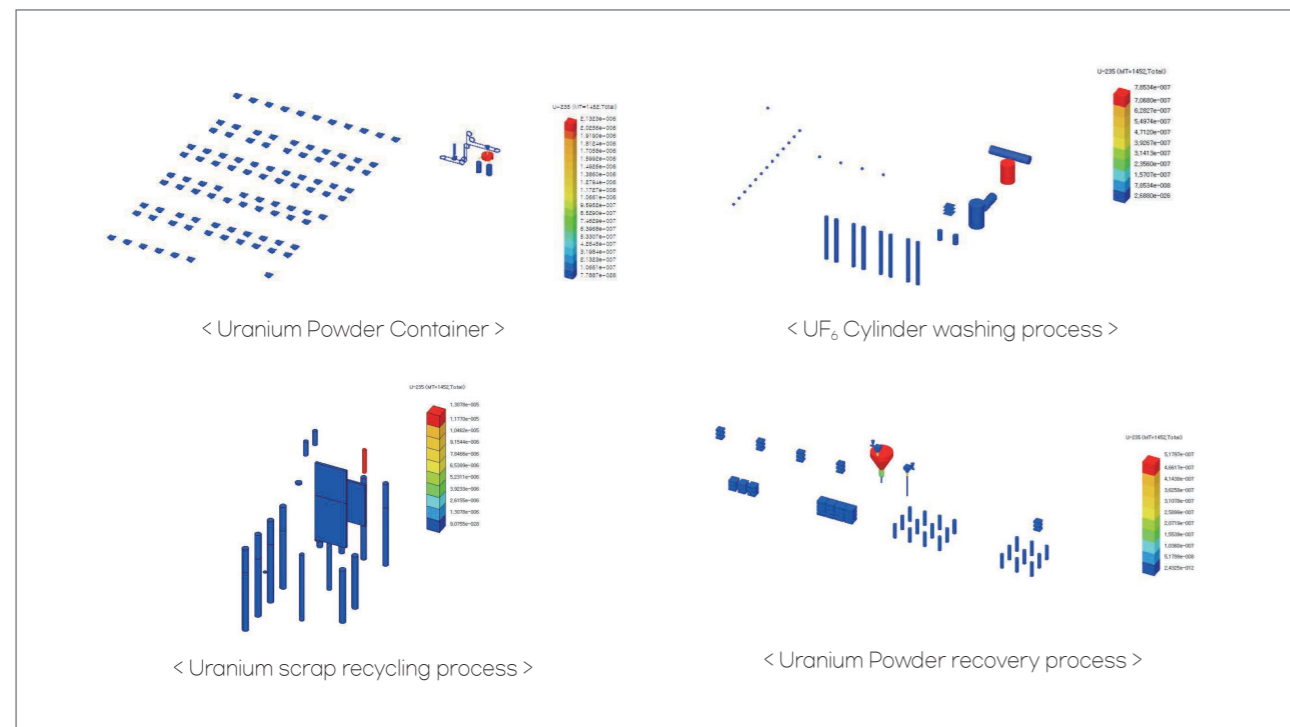
● NUCLEAR
FUEL DESIGN
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Facilities handling radioactive materials must maintain subcriticality condition by controlling shape and placement of container, the amount and enrichment of material, or using neutron absorbers. Criticality analysis is a technique to evaluate the ratio of the number of new neutrons to extincting neutrons that causes nuclear fission by using the Monte Carlo method.

Description

* Background

- According to the enforcement regulations of the Nuclear Safety Acts, regulations on packaging and transportation of radioactive materials, safety inspection guidelines, the subcriticality condition must be maintained during handling radioactive materials or making changes in facilities.



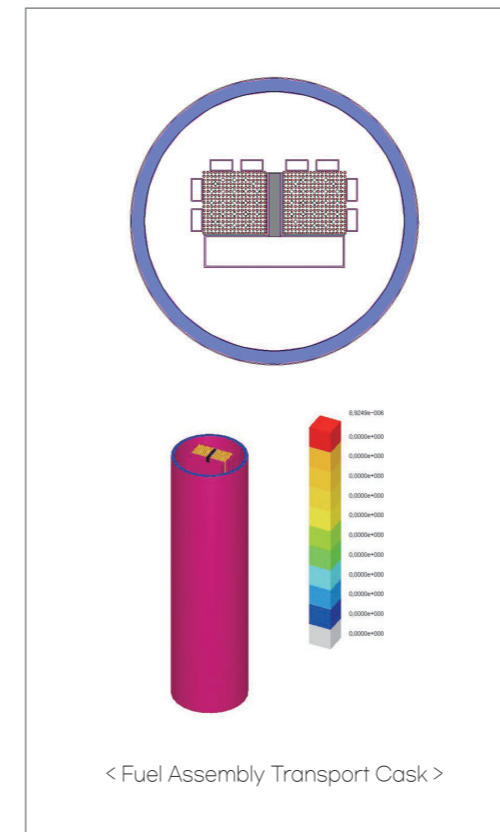
< Results of Radioactive Facilities Criticality Analysis >

* Necessity

- Nuclear criticality analysis is required to evaluate safety in spent nuclear fuel transporting cask, storage pool or when there is infrastructure change in radioactive material-handling facility.

* Technique Constitution

- Benchmarking : Determine the Upper Subcritical Limit
- Using NUREG/CR-6361, OECD/NEA Handbook
- Criticality Analysis : Use SCALE KENO
- Results of Fuel Assembly transport cask Criticality Analysis



Distinctiveness

* Characteristic

- Provide the best results using the latest analysis codes

* Benefit

- Save outsourcing service cost by performing the critical analysis in-house and provide manpower supporting licensing
- Secure the validity of the project and increase the possibility to obtain license by improving radioactive facility, equipment, nuclear fuel(spent fuel) criticality analysis capability
- Improve customer satisfaction and reliability by performing the critical analysis safety evaluation objectively and accurately

Experience

* Ongoing

- Uranium scrap recycling process(under review)
- Local manufacturing of main process of reconversion(under review)
- Powder recovery process(under review)
- Fuel Assembly transport cask(under review)
- Change of emergency generator operation condition(under review)
- UO₂-Gd₂O₃ pellet & powder storage demolish(under review)
- Uranium recovery process from NaDU scrap(performing)
- UF₆ cylinder storage(performing)

* Obtain Licensing

- Uranium purification process
- Uranium powder precleaning facility
- UF₆ cylinder washing & waste liquor treatment equipment in radioactive waste management facility
- Rod scanner

Deliverables

- Criticality Safety Analysis and Support for Licensing

TECHNOLOGY
READINESS
LEVEL(TRL)

- Actual system proven through operation

BUSINESS
MODEL

Technology Transfer

Licensing

Joint search

Service Execution

Others