

KNF-
SF-05

SAFER : Safely Adapting FastenER

●
NUCLEAR
FUEL DESIGN
DEPT.
Kim Hyeong Koo
T. 042-868-1183
E. hkkim
@knfc.co.kr

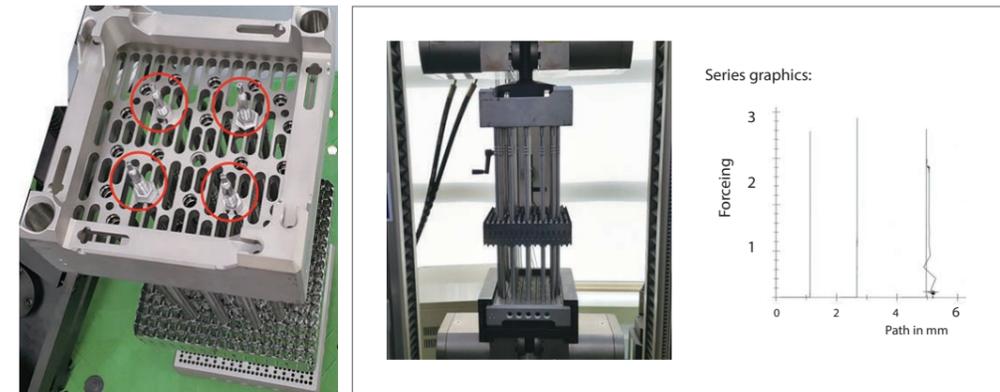
Among the Westinghouse type spent fuel(SF) stored in spent fuel pools(SFP), there are many SFs which are concerned about the separation of top nozzle(TN) and guide tubes(GT) due to the corrosion of GT sleeves connecting TN and GT. SAFER is a supplementary tool to handle these fuels. It is installed at the SF GT bulge and fastens the TN and GT with high clamping force.

Description

* Background

- NRC Information Notice 2002-09
 - In 2001, there was a fuel drop accident caused by TN separated from GT during handling the fuel for SF inspection in the SF

- Pool in North Anna power plant, USA.
 - The NRC investigated the cause of the accident and surveyed the similar cases. It turns out there were several similar accidents including the fuel for Kori 1 unit.
 - The IGSCC(Intergranular Stress Corrosion Cracking) made of SS304 material was found to be the main cause of the top nozzle separation. SS304 is a GT sleeve material that contains high carbon.
 - Supplementary tool is necessary to handle the SF with SS304 GT sleeve safely.
- SFP storage tank saturation
 - The capacity of the domestic SFP storage tank is expected to be saturated in the near future.
 - All of the SF with risk of top nozzle separation must be checked before the dry storage in accordance with decommission of Kori 1 unit.
 - The SFs with top nozzle separation risk require precautionary measures.



< SAFER Installation >

< SAFER Fastening Strength Test and Results >

* Purpose and Necessity

- To enhance the SF handling integrity with top nozzle separation risk stored in domestic SFPs.
 - Currently about 1,500 SFs with the top nozzle separation risk are stored in SFP.
 - To handle these fuels safely, it is necessary to install a supplementary tool.

Distinctiveness

* Characteristic

- SAFER is installed at the GT bulge, and it can fasten the TN and the GT using the structural force instead of the friction force which is more stronger fastening force.
- Four SAFER installation provide high fastening force that is three times stronger than the SF weight, resulting in superior performance compared to other existing products.
- Since SAFER uses screw fastening method, it contributes to the improvement of SF integrity compared with the conventional method which requires excessive installation force to the GT to obtain high friction force.
- SAFER is about 15 cm in length and is convenient for storage and handling.

* Benefits

- Prevent TN separation during SF removal.
- For the domestic SF dry storage project followed by SFP saturation, for a start, SAFER can be applied to the about 1,500 bundle of SF with TN separation risk
- SAFER's excellent function can attract overseas markets

Experience

- SAFER performance test was completed
- Install/removal tools are being developed.
- Licensing process for commercial usage is being planned.

Deliverables

- SAFER, A package of SAFER Installation and dismantling Tools
- Engineering services for installation, licensing support

TECHNOLOGY READINESS LEVEL(TRL)

- Component validation in relevant environment

BUSINESS MODEL

Technology Transfer

Licensing

Joint search

Service Execution

Others