

Confirmatory Procedure of Spent Fuel Information for Spent Fuel Transport to the Interim Storage Facility

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1. Introduction

The national basic policy for high level radioactive waste management of Korea was established and promulgated, taking into consideration the national/international trends on policy and technology development in 2016. According to the national plan, the siting for deep geological disposal facility of high level radioactive waste will be proceeded by 2028. Once the site was selected at somewhere, centralized spent fuel storage facility will be constructed by 2035 at the same site while research program is ongoing to determine the compatibility of the site for disposal facility. Additionally, spent fuel will be expected to store at onsite dry storage cask until finishing the central interim storage facility in Korea. Therefore, spent fuel will be transported to the onsite storage facility or offsite storage facility in the future. Once spent fuel stored in storage cask, it is almost impossible to inspect the integrity of spent fuel through visual inspection, etc. For that reason, the aim of this study is to establishment the procedure to ensure the status and the integrity of spent fuel before storing into the dry storage cask.

2. Confirmatory procedure of spent fuel information

2.1 Regulatory position of spent fuel information

The comprehensive spent fuel information can be divided 3 categories. First information will be composed of foundation data like as the characteristics of nuclear fuel, operational histories in nuclear reactors, positions in spent fuel pool, etc. Second information is derived through calculation or evaluation of 1st information like as burnup of spent fuel, radioactive isotope inventory in spent fuel, etc.

Third information is related to the integrity of

spent fuel cladding through confirming the cladding status, etc.

These multi-layered information should be produced or updated whenever spent fuel are generated and moved, and these are stored in the comprehensive spent fuel DB system. Information related to radionuclide inventory with axial or in assembly, as a second information, are needed to be secured through destructive analysis or non-destructive analysis methods for the accuracy of information. Axial radionuclide inventory should be evaluated by the exact simulation computer code, Fig. 1 shows how this computer code should be developed.

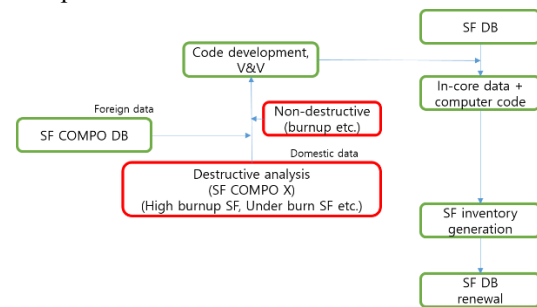


Fig. 1. Spent fuel inventory evaluation computer code development procedure.

As a third information, data related to spent fuel integrity should be obtained by direct inspection methods like as visual inspection before transporting spent fuel to the dry storage cask. These data should be stored in the comprehensive spent fuel DB system as well.

2.2 Confirmative procedure for spent fuel information

The comprehensive spent fuel DB system should be developed and operated by national authority or organization which is responsible to manage spent fuel. Spent fuel information which is generated, collected, and managed by utility should be transferred to the competent organization who operate comprehensive spent fuel DB. Before

transferring spent fuel DB to the competent organization, spent fuel DB should be confirmed and updated by the following procedure as shown in fig. 2. Since spent fuels have been stored in spent fuel pool for a few decades, spent fuel should be confirmed its integrity and matched both physical spent fuel and its information of document. As shown in fig. 2, spent fuel information should be generated in accordance with QA program which was approved by the regulatory body in advance. If it can't meet the QA procedure, spent fuel information should be reconfirmed by various methods like as direct or indirect measurement as shown in fig. 2. If spent fuel transferred to the dry storage cask which burnup credit was approved, burnup of spent fuel should be measured to prevent misloading. In case dry storage cask is not applied burnup credit, burnup measurement may be skipped and spent fuel can be loaded to dry storage cask directly. However, burnup of target spent fuel should be measured randomly because it should be confirmed the match physical spent fuel and its information of document. Finally, whole implementation following the procedure of fig. 2 should be recorded in comprehensive spent fuel DB.

3. Conclusion

Reliability of the safety information on spent fuel is very important because safety information will be used as basic data for safety evaluation and verification for transportation, storage and disposal of spent fuel. For this reason, this study proposed regulatory position and confirmatory procedures for

verifying spent fuel safety information. These are suggested after reviewing domestic and international technology level [1,2,3] and confirming actual applicability of domestic nuclear industry.

Regulatory position and confirmatory procedures will be applied to the development of review guidelines for spent fuel safety information in the future.

ACKNOWLEDGEMENT

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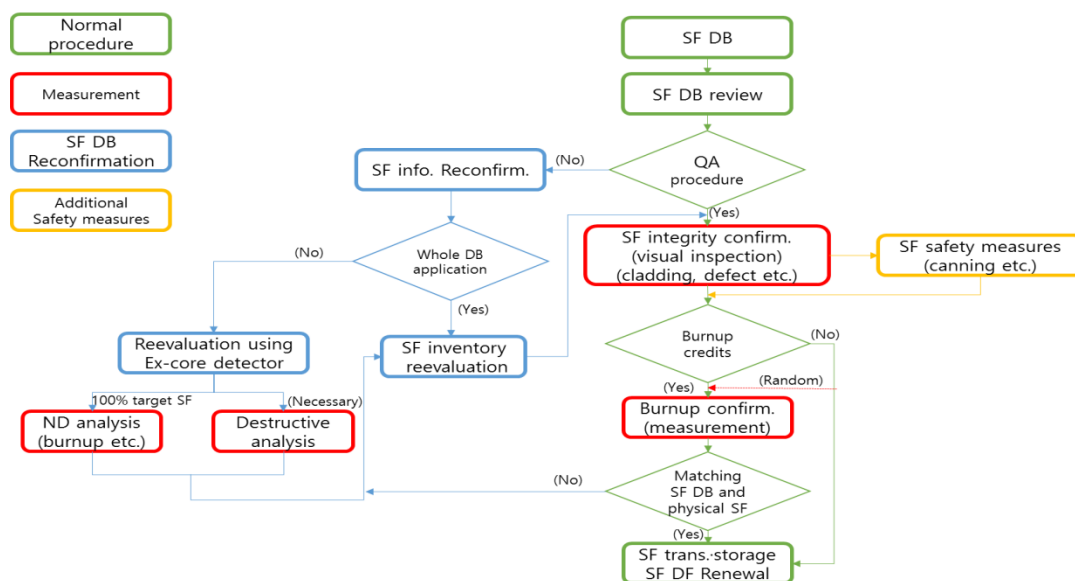


Fig. 2. Confirmative procedure of spent fuel information.