

Preliminary Considerations for Preparing a Domestic Decommissioning Radiological Environmental Impact Assessment

Sang-Ho Lee and Chang-Lak Kim*

KEPCO International Nuclear Graduate School, 658-91Heamaji-ro, Seosaneng-myeon, Ulju-gun,
Ulsan, 689-882, Korea
jjj1sh2@naver.com

1. Introduction

As Kori Unit1 is permanently shut down in June, 2017, permanent suspension and decommissioning of domestic old aging nuclear power plants are anticipated. Domestic nuclear power plants should conduct a radiation Environmental Impact Assessment (EIA) based on the construction, operation and accident of the power plant as required by the Nuclear Safety Act. But there is no detailed regulation on decommissioning radiation EIA in Korea.

In this paper, it reviewed the issues that should be considered in advance for the preparation of the decommissioning radiation EIA.

2. Methodology

2.1 Review of whether Final Decommissioning Plan includes Radiological Environmental Impact Assessment or Not

Major nuclear power nations such as the United States, Canada, the United Kingdom, and France are operating in an integrated form of EIA and radiation EIA. In other words, radiation EIA is included in the EIA. In Korea, there is no detailed regulation on the evaluation of decommissioning radiation environment impact. So, it reviewed the domestic nuclear regulation whether there is a need to separately prepare the NPP decommissioning radiation EIA in Korea.

There are two options to consider when making a nuclear decommissioning radiation environment impact assessment report as below:

- ① Include radioactive environmental impact assessment in the decommissioning plan
- ② To prepare separate disassembly radiation environmental impact assessment report

2.2 Domestic Atomic Energy Law

Table 1. Decommissioning Environmental Impact Assessment related Atomic Energy Law

Nuclear Safety Act
Article 103 (Feedback from residents). ① Provide a draft of the radiation environmental impact assessment report or make public hearings. ② Provide a draft of the decommissioning plan or make public hearings.
Regulations on technical standards such as reactor facilities
Article 85-16 (Decommissioning Environmental Impact Assessment). ① The operator shall evaluate the expected radiation environmental impact assessment due to the decommissioning of the reactor facility. ② The operator shall establish and implement an environmental monitoring plan before and during decommissioning of the reactor facilities.

Based on the above laws and regulations, it is a decision to be included in the decommissioning plan rather than requiring the creation of a radiological EIA at the time of decommissioning. This is not a concept to prepare separate radiological EIAs.

2.3 Environmental Impact Assessment Items Considering Decommissioning

There are three types of EIA (environmental monitoring before decommissioning, environmental monitoring during decommissioning, impact on nearby residents) in decommissioning plan. The environmental monitoring before decommissioning is performed in the same as the environmental monitoring during operation. Survey plans, analysis items, detection target values, data processing and evaluation of environmental monitoring during decommissioning is performed in the same as the environmental monitoring before decommissioning. However, the decommissioning radiation environment impact assessment report should additionally describe the issues caused by decommissioning. Table 2 shows the EIA items due to decommissioning activities.

Table 2. Environmental Impact from Decommissioning Activities

1. Remove Fuel	<ul style="list-style-type: none"> • Transfer fuel to spent fuel pool • Drain primary system • Process liquid
2. Organization Changes	<ul style="list-style-type: none"> • Reduce staff • Employ contractor or additional staff • Adjust site training
3. Stabilization	<ul style="list-style-type: none"> • Drain and flush system • Isolate systems, structures and components that are no longer required • Rewiring of site to eliminate unneeded electrical circuits
4. Post-Shutdown Surveys	<ul style="list-style-type: none"> • Baseline surveys for the decontamination work • Continual surveys
5. Create Nuclear Island	<ul style="list-style-type: none"> • Install electrical power to SFP • Move old or install new security-related power
6. Chemical Decontamination of Primary Loop	<ul style="list-style-type: none"> • Cutting, chemicals in, chemicals out, cleanup
7. Large Components Removal	<ul style="list-style-type: none"> • Remove reactor vessel and internals intact or cut up • Steam generator and outer large components removed intact or cut up
8. Decontamination and Dismantlement Phases of DECON	<ul style="list-style-type: none"> • Chemical decontamination (surface/specific components) • Decontamination pipes in walls • High-pressure water sprays • Remove contaminated soil • Preventive and corrective maintenance on SSCs
9. System Dismantlement	<ul style="list-style-type: none"> • Cut out radioactive piping • Remove large and small tanks or other radioactive components from the facility
10. Structure Dismantlement	<ul style="list-style-type: none"> • Rubblization • Remove structures that were necessary for plant operation
11. LLW Packaging and Storage	<ul style="list-style-type: none"> • LLW Packaging and Storage
12. Transportations	<ul style="list-style-type: none"> • Large components • SF transportation from pool • LLW/VLLW transportation to disposal facility
13. License Termination Activities	<ul style="list-style-type: none"> • Complete final radiation survey • Partial site release
14. Newly Installed Decommissioning Waste Treatment	<ul style="list-style-type: none"> • Melting related accidents (fire, human injury)
15. Impact from Nuclear Power Plant Operation	<ul style="list-style-type: none"> • Evaluation of exposure dose (residents, animals, plants)

3. Conclusion

This paper discusses considerations for creating a decommissioning radiation environment impact assessment. As a result, the final decommissioning plan included the evaluation of the decommissioning radiation environment impact, and it was judged that it was not necessary to prepare it separately. In addition, the decommissioning radiation environmental impact assessment is the same as the operating radiation environmental impact assessment, but the additional items arising from the decommissioning should be described.

4. Acknowledgement

This research was supported by the Nuclear Safety

Research Program through the Korea Foundation of Nuclear Safety (KOFONS), granted financial resource from the Nuclear Safety and Security Commission (NSSC), Republic of Korea (No. 1305009).

REFERENCES

- [1] Nuclear Safety and Security Commission Notice, "Regulations on the Preparation of Nuclear Decommissioning Plans", July, 2015.
- [2] NUREG-0586, "Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities", November, 2002.