

## A study on the influence of the regulatory requirements of a nuclear facility during decommissioning activities

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### 1. Introduction

A preliminary decommissioning plan for a nuclear power facility that will construction and operation should be submitted to the NSSC (Nuclear Safety and Security Commission).

The preliminary decommissioning plan should be written with various chapters such as a radiological characterization, a decommissioning strategy and methods, a design for decommissioning usability, a safety evaluation, decontamination and dismantling activities, radioactive waste management, an environmental effect evaluation, and fire protection.

The process requirements of the decommissioning project and the technical requirements and technical criteria should comply with regulatory requirements when dismantling of a nuclear facility.

The requirements related to safety in the dismantling of a nuclear facility refer to the IAEA safety serious [1, 2].

The present paper indicates that a decommissioning design and plan, dismantling activities, and a decommissioning project will be influenced by the decommissioning regulatory requirements when dismantling of a nuclear facility.

In addition, it introduces an interface between the regulatory requirements and the dismantling activities, such as radiation safety, a decommissioning strategy and methods, and site remediation to be considered as a dismantling of a nuclear facility through the decommissioning requirements system being developed.

### 2. Methods and Results

#### 2.1 Decommissioning requirements management

The decommissioning of the nuclear power plant and a nuclear facility have to organize various kinds of information, from a shutdown to site remediation, such as radiation safety management, radiation protection management, radioactive waste management, risk management, configuration management, quality assurance management, decommissioning cost evaluation, and schedule assessments.

The whole life cycle of the decommissioning is divided into 4 groups: a decommissioning strategy, a decommissioning design and plan, decontamination and decommissioning activities, and a decommissioning project.



Fig. 1. Group items that should be managed for the requirements of the whole life cycle of the decommissioning

Regulations related to decommissioning, policy, and a variety of conditions are carried out in a decommissioning strategy.

To manage the 19 decommissioning areas in figure 1, the regulatory requirements should be extracted first.

The design requirements should satisfy the extracted regulatory requirements. The requirements of a decommissioning project that will be needed at the dismantling activities stage, as well as the technical requirements, and technical criteria, must comply with the regulatory requirements.

The decommissioning design and plan are classified into site characterization, a cost assessment, the amount of radioactive waste evaluated, and licensing.

The decontamination and decommissioning activities are divided into radiation management, decontamination and dismantling, radioactive waste treatment, and site remediation.

A decommissioning project are categorized an organization, workforce, and equipment.

#### 2.2 Data structure of the decommissioning requirements management

A data structure use to organize the decommissioning requirements must define an entity of the requirements and the relationship between the requirements.

An attribute that will have the requirements based on the entity and the relationship have to be defined.

Figure 2 shows the relationship of the requirements of a decommissioning project that will be carried out based on the regulatory requirements, the technical requirements and criteria, the decommissioning process, and the WBS (Work Breakdown Structure).

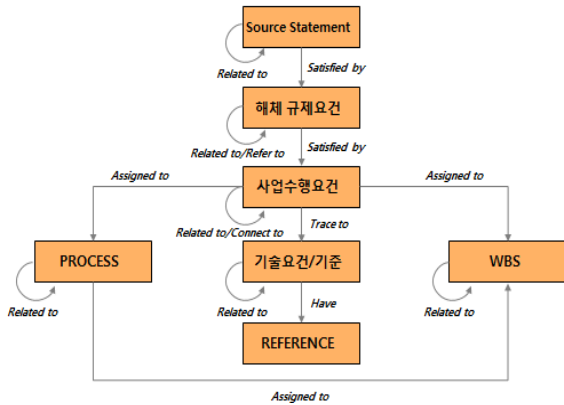


Fig. 2. A schematic diagram of data structure for the decommissioning requirements management

### 2.3 Interface between the decommissioning requirements

A connection between the decommissioning group has a traceability with a direction such as the regulatory requirements → the requirements of the decommissioning project → technical requirements and technical criteria.

The connection relationship of the regulatory requirements, the requirements of the decommissioning project, the technical requirements, and the technical criteria are shown in Fig. 3.

As shown in Fig. 3, the regulatory requirements (Nuclear Safety Act, Enforcement Decree of the Nuclear Safety Act, Enforcement Regulation of the Nuclear Safety Act, NSSC Notification, and Regulation Guide) have an effect on the decommissioning design and plan, the dismantling activities, and the decommissioning project.

The decommissioning design and plan require the technical requirements and criteria need in the dismantling activities. We can determine that all of requirements that need a decommissioning project have interconnections between 4 groups.

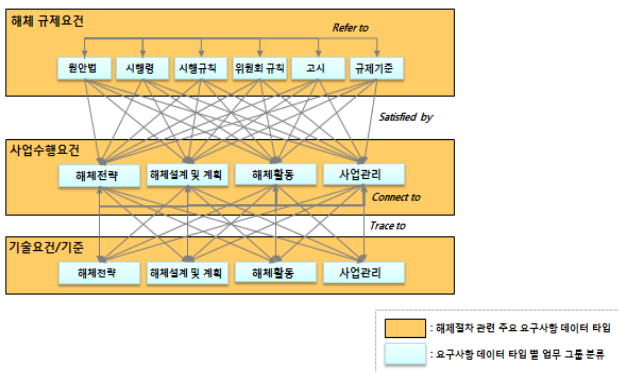


Fig. 3. Relationship between the decommissioning regulatory requirements, the decommissioning project requirements, and the technical requirements/criteria

### 2.3.1 Relationship between the regulatory requirements and the dismantling activities

Dismantling activities should consider the radiation management, the decontamination and dismantling activities, the radioactive waste treatment, and the site remediation.

It is not easy to recognize the relationship between the regulatory requirements and the dismantling activities when dismantling the facility and structure of a nuclear facility.

The system shows these connections through a traceability in order to solve the problems.

Figure 4 shows the relationship between the dismantling activities and the regulatory requirements.

When establishing a strategy for the dismantling of the usability, you can refer to Clause 6, Article 85 of the Regulations on the technical standards for nuclear reactor facilities.

In the case of the procedures and a method for the self-disposal of radioactive waste, you can refer to clause 1, Article 107 of the Enforcement decree of nuclear safety.

For the dismantling of the facility and the structure, we should consider the final status report for the restoring of a site. You can find the regulatory requirements through clause 1, article 107 of the Enforcement regulations of the nuclear safety act.

Fig. 4. Relationship between the regulatory requirements and radiation management, D&D, radioactive waste treatment, and site remediation during the decommissioning activities

## 3. Conclusions

Following the design of the data structure for the managing of the decommissioning requirements, an interface between the regulatory requirements, the decommissioning design and plan, the decommissioning activities, and the decommissioning project was implemented.

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We hereby paved the way to find the effect of the regulatory requirements on the decommissioning of a whole area from the decommissioning strategy to the radioactive waste treatment when dismantling a nuclear facility.

The decommissioning requirements have a unique feature in terms of a horizontal relationship as well as a vertical relationship from the regulation requirements to the decommissioning technical requirements.

The decommissioning requirements management will be conducted through research that can recognize a multiple relationship in the next stage.

**REFERENCES**

- [1] IAEA Safety Reports Series No. 36, "Safety Considerations in the Transition from Operation to Decommissioning of Nuclear Facilities", 2004
- [2] IAEA Safety Standards Series No. WS-R-5, "Decommissioning of Facilities Using Radioactive Material", Safety Requirements, 2006