Relationship of Project Management Risk and Radiological Safety during the Decommissioning of Nuclear Facilities

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1. Introduction

The triple constraints of project management - scope, schedule, and cost - are in conflict with each other, and if one thing changes, it affects the other. In addition, the balance between the three factors affects the quality of the project. Project risk management identifies and manages factors that affect project elements to ensure compliance with the quality of the project, and radiation safety management can be viewed as part of project quality management in nuclear decommissioning projects. Therefore, this study briefly identified the relationship between decommissioning project risk and radiological safety factor.

2. Methods and Results

2.1 Optimization attribute factors of Radiological safety

Radiation exposure is affected by qualitative and quantitative factors. The exposure optimization attribute factors presented in ICRP 101b consist of eight groups, as shown in the following Table 1. Considering the attribute factors in the table, optimized protection measures can be selected in public and worker exposure situations when decommissioning nuclear power plants.

Table 1: Optimization attribute factors [1]

Factor 1 : Characteristics of the exposed population
- Gender - Age - Health status - Sensitive groups - Habits
Factor 2 : Characteristics of the exposure
- Distribution of exposures in time and space - Number of individuals - Minimum/Maximum/Mean individual dose - Statistical deviations - Collective dose associated with ranges of individual doses - Likelihood of potential exposure - Pre-existing radiological conditions
Factor 3 : Social considerations and values
- Equity - Ability to control - Sustainability - Intergenerational consideration - Individual benefit - Social benefit - Level of information/know-ledge held by those exposed - Social trust
Factor 4 : Environmental considerations
- Impact on fauna and flora - Impacts on climate
Factor 5 : Non-radiation hazards
Factor 6 : Technical and economic considerations for protective options
- Feasibility - Costs - Uncertainties
Factor 7 : Political aspects
Factor 8 : Regulatory constraints

2.2 Risk families during the decommissioning project

In project management, risk management process can control the unexpected events in where the likelihood of risks and impact of negative threats can be minimized whereas the likelihood and impact of positive opportunity factors can be maximized. The activities in decommissioning project of nuclear power plants are complicated, and have a large range of risks. The first process of risk management, the risk identification process, enables the implementation of potential risk identification for each project based on the risk family. The decommissioning risk is divided into 10 categories. Also, subcategories of risk family can be supplemented from experiences of overseas decommissioning [3]. Risk families of decommissioning NPP project can be shown as Table 2.

Table 2: Decommissioning project risk families [2]

Initial condition of facility	- Physical status - Radiological status and characterization - Status of waste and materials - Site characteristics
End state of decommission-ing project	- Definition of the end state of the project - Difficulty in achieving the end state

Management of waste and materials	- Waste management policy - Waste estimation and characterization - Waste management infrastructure (on-site/off-site)
Organization and human resources	- Organizational structure - Human resources
Finance	- Cost - Funding
Interfaces with contractors and suppliers	- Management of contractors and suppliers - Contractor and supplier oversight
Strategy and technology	- Decommissioning strategy - Decommissioning scenarios - Technology
Legal and regulatory framework	- Laws and regulations - Licensing process
Safety	- Radiological safety - Conventional safety - Security
Interested parties	- Communication - Involvement of interested parties

2.3 The relationship between Project Management Risk and Radiological Safety

The two presented groups of Table 1 and Table 2 are briefly connected as shown in the following Figure 1.

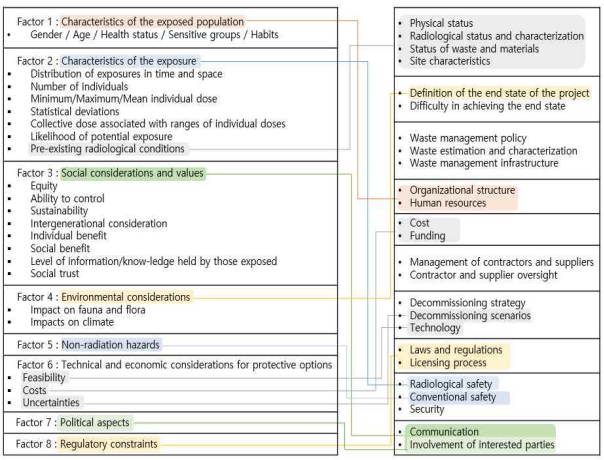

Fig. 1. The relationship of project management risk and radiological safety

It can be seen that it is not only directly related to radiation hazards, but also to the other factors. To summarize the key elements, the following could be supposed:

- Optimization attribute factors of radiological safety and decommissioning project risk families are similar in most factors.
- The risk management could affect radiological safety during decommissioning.
- The clearer the identified risk prompts, the more detail the factors that need to be considered to optimize radiation exposure.
- When doing optimizing decision, the hazard-related information could be obtained from the safety assessment, and other information related decommissioning project could be found in the risk assessment register data (e.g. cost-benefit analysis).

Therefore, when making ALARA decisions during decommissioning project, it may be desirable to consider project risk together.

3. Conclusions

Using the information and experience investigated would manage the possible risks in the decommissioning project. Risk management could also prevent or mitigate the negative effects of unexpected events. However, the decommissioning project is a large-scale and long-term project, making it difficult for the person in charge to consider radiation protection to grasp all of this information alone. Thus, in addition to the exposure environment and technical aspects, project managers could further optimize the exposure of decommissioning workers and improve quality if they constructed an information provision scheme to selectively consider recognizable triggers from the project's risk perspective.

REFERENCES

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