Dismantling Procedure on the Decommissioning Cost for the Research Reactor

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1. Introduction

The DECOMMIS system was developed for systematic management of data generated at the dismantling site and for efficient operation of the dismantling project. The DES system consist of 5 unit systems such as the DEFACS system that can calculate the amount of dismantled waste, the DEWOCS system that elicits worker productivity factors, the DEEMOS system that can evaluate the costs of dismantling, and DEPES process.

This paper can manage data generated during the dismantling of KRR2 (Korean research reactor, TRIGA Mark-III) and calculate the amount of dismantled waste, derive worker productivity factors, and utilize these factors to assess the costs of dismantling and evaluate the decommissioning process in advance.

2. Decommissioning System Engineering

The decommissioning engineering system consists of five unit systems. Figure 1 illustrates the relationship between the decommissioning engineering system and the decommissioning project.

3. Activated concrete of the pool at the KRR2

3.1 Decommissioning cost on the dismantling procedure

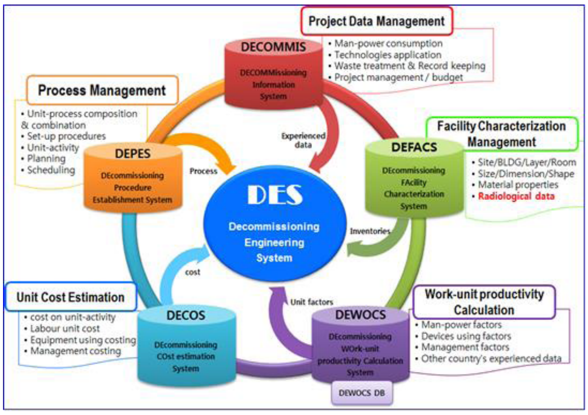

Fig. 1. Relationship diagram between unit systems.

Data entered in connection with the removal of activated concrete from the KRR-2 to the DEFACS which manages facility characteristics is shown in Table 1.

Table 1. The activated concrete structure input screen

Code Management	Facility Management	Productivity Calculation	Cost Evaluation	Prediction of Process

▣ Input WBS		▣ Input contamination	
KRR-W>KRR-2>Remove an activated concrete>Dismantling an activated concreate			
Facility	KRR-W	Width(m)	17.7
Building	KRR-2	Length(m)	9.9
Layer/Area	Remove activated c	Height(m)	7.6
Room		Diameter	
Equipment		Thickness(m)	0.01
Capacity		Depth	
Amount		Specific gravity	2.7
Building/Facility	▣ Buliding	Area(m^2)	15.96
Contamination	▣ Contamination	Volume(m^3)	136.68
Non-contamination	□ Non-C		
Type	Cube	Weight(kg)	369.034
Mateirals	Co-Concrete	Facility code	
Weighting factor		WBS code	K2-15.1

The system has been programmed to enter detailed information about the structures to be dismantled in order to assess the amount of dismantled waste such as specifications and specific gravity, area, volume, weight, and contamination, form and material.

Worker productivity factors are evaluation factors that determine how much time an operator has spent in decontamination and dismantling the target structures (units, area, volume, and weight).

The equipment cost used for removal of an activated concrete during removal of concrete in the KRR 2 is calculated by multiplying the equipment cost associated with the equipment loss database with the corresponding equipment, equipment productivity factors and weights as basic data.

The costs incurred for each discipline are that 61,489,828 won was incurred for decommissioning operations, 13,724,189 won for radiation/ radioactivity management and 8,069,112 won for quality control.

3.2 Results and Consideration

The reason why it is necessary to distinguish between the parts of activated and the non-activated prior to dismantling of KRR2 is not only that it can reasonably establish the dismantling process, but also it can reduce the exposure of workers and assess the costs of dismantling. Dismantling procedures were performed by considering that the buried piping is part of the radioactivity, and the remainder becomes the non-radiation part. We had a good lessons learned from the case study as below;

To prevent the contamination from spreading, the verification of the containment facility inside and outside was necessary during decommissioning of the activated structure, and also, for non-active parts, for the decommissioning in the environment wrapped with temporary coating or temporary vinyl, it is necessary to prepare a contamination prevention plan.

One of the important issues during the decommissioning is to always consider the possibility of contamination spreading by decommissioning of the non-active parts using contaminated equipment.

There is a big difference in the decommissioning cost of the non-active part according to how to decide the active part and non-active zone. As a conclusion, in the process of assessing the decommissioning cost, as a result of decommissioning the non-active part first, the exposure reduction and contamination spread prevention effect can be obtained.

4. Conclusion

Using data generated from dismantling research reactors and conversion facilities, the dismantling engineering integration system was developed that can evaluate and predict significant factors such as the reduction of dismantling facilities and prediction of unit work productivity factors, cost of dismantling, and calculation of dismantling processes.

In addition, through the development of an integrated dismantling engineering system, other nuclear facilities and systems were developed to secure characteristics of dismantling unit, factors of dismantling unit productivity, quantity of dismantling waste, and field data of conversion facilities.

The calculated decommissioning productivity values can be used as a basis for inferring the plant's decommissioning productivity values, and since the plant has been programmed to provide the cost assessment results for dismantling operations by applying the actual government labor cost per dismantling operation.