

Decommissioning Work-unit Productivity Calculation System

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1. Introduction

The KRR-1 & 2 (Korea Research Reactor 1 & 2) and UCP (Uranium Conversion Plant), both are nuclear facilities at KAERI (Korea Atomic Energy Research Institute), were decommissioned. During the decommissioning activities, all information and data, which generated from the decommissioning project, were record, input and managed at the DECOMMIS (DECOMmissioning Information management System). [1] This system was developed for the inputting and management of the data and information of the man-power consumption, operation time of the dismantling equipment, the activities of the radiation control, dismantled waste management and Q/A activities. And it was also for the help of the understanding of the public peoples on the safety and management of the decommissioning work and radioactive waste control from the decommissioning site.

When a decommissioning is planed for a nuclear facility, an investigation into the characterization of the nuclear facility is first required. The results of such an investigation are used for calculating the quantities of dismantled waste and estimating the cost of the decommissioning project. That is why, the DEFACS (DEcommissioning FAcility Characterization DB System), which was established for the management of the facility characterization data.

The DEWOCS (DEcommissioning Work-unit productivity Calculation System) was developing of the workability on the decommissioning activities. The unit- work productivities are calculated through this system using the data from the two systems, DECOMMIS and DEFACS. This result, the factors of the decommissioning work-unit productivities, will be useful for the other nuclear facility decommissioning planning and engineering. And also, for the total system, DES (Decommissioning Engineering System), which is now developing for the decommissioning design and plan.

2. Decommissioning Work-unit Productivity Calculation System

2.1 Objectives of the DEWOCS

For the decommissioning engineering of the nuclear facilities, the workability factors are important for the estimation of the cost, man-power and the project scheduling. To get the workability factors, the data

from the DECOMMIS and DEFACS were use and calculated. The DECOMMIS served the data of the man-power consumption, time of the using the dismantling device, radiation control activities and the waste management and Q/A activities. The DEFACS offers the facility characterization data. The DEWOCS calculates the result of the decommissioning workability using two data, and the result shows as of the m-h/unit weight, m-h/unit volume and m-h/unit area against each object items. The results of the DEWOCS are applied as of the factors which were compounded for the established the estimation of the decommissioning engineering, design and planning.

2.2. Soft and hard ware

The minimum requirements for the hardware and software system environments are shown in the Table I. As shown in the table, the hardware of the server is a workstation desktop computer, and for the client, a PC grade computer with Pentium CPU is used. Oracle software operating on Window O/S, was selected because it is widely used at KAERI for internal communications and the relation between the existing system, DECOMMIS, which is the decommissioning information management system. The system was designed to operate on the internal LAN network of KAERI, and to input data at the PC of the system manager. All the inputted data is duplicated in a back-up system.[2]

Table I. Minimum requirements for the system environments

Item	System	Minimum Requirements	
Soft ware	Server	Browser	Internet Explorer 5.5
		DB server	ORACLE (RDBMS 11g)
		WEB server	ORACLE Application Server 10g
		OS	Window 2008 Server
		Middle ware	PL/SQL, Java, Jsp Net
	Client	Browser	Internet Explorer 5.5
OS		Window 98	
Hard ware	Server	CPU: Intel XEON E5520 2.26 HDD: 1 TB SATA RAM : 12G	
	Client	Client PC CPU: Pentium series HDD: 40 GB RAM : 512 MB	

2.3 System of the DEWOCS

The items of the objects were separated and grouped. The main objects are selected as of the KRR-2 and the Uranium Conversion Plant at KAERI. Because of, when doing these two facilities were decommissioning, all decommissioning information and data were kept to record, input and manage through the DECOMMIS. And the data have a value of the each item, which were man-power consumption, an operation time data of the decontamination and dismantling devices, a radiation control activities, a waste management activities and an independent activities of the project were selected for the workability calculation of the decommissioning work. The DEFACS also have the value of the data on the properties and characterization of the nuclear facility. In DEFACS, all the data from each nuclear facility was categorized and inputted into several data fields, which were chosen by considering the facility characteristics. The kinds of data inputted were the dimension, type, shape, density, quantities, material properties, and relative code. That is why the input codes were related on the code management system of the DECOMMIS and DEFACS. The codes were divided as decontamination and decommissioning working codes, facility codes and WBS codes on all items. Those were categorized as large, middle, small and detail group according to the facility properties and technical characterizations. All data is processed in a simplified and formatted manner in order to calculate the productivities of the decommissioning work-unit. The data was processed by the output system to show the adequate variables for the required process. This process was designed to calculate by the unit area, unit volume, and unit weight against to the value of the data according to the facility codes and WBS codes.

The output system consists of four main parts which were result of the calculation on the each selected object with facility code and WBS code: a man-power consumption, operation of the technical application on the decontamination, dismantling, waste management activities and radiation control activities, independent items and others, which were Q/A activities, R & D work and project management.



Fig. 1. The output system on result of the man-power calculation data

The man-power calculation result shows the man-power consumption per unit area, weight and volume of each selected items according to the WBS code and facility code. And the result of that value could be more detail value according to the kinds of work properties, as like the radiological work, radiation protection work, waste management work and Q/A work. (Fig. 1)

The value of the technical data was categorized on the dismantling technologies, the monitoring and surveillance, the waste management and the other technologies. The sub categorizations of the forty-four dismantling technology were separated by normal cutting, remote cutting, and site decontamination and protection technologies. The other technologies items were separated many sub technologies items like the dismantling items. This results, after be calculated, shows the used time of the each devices per unit area, volume and weight, such as hr/unit-weight, hr/unit-area and hr/unit-volume according to the facility code and WBS code of the selected objects. (Fig. 2)

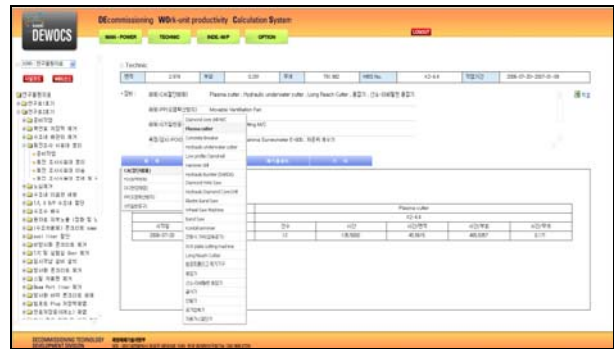


Fig. 2. The result of the technical calculation data through the output system

Through this DEWOCS system, the results of the work-unit productivity factors will be applied a decommissioning engineering system as basic information. This system will also be helpful for a study on the decommissioning plans for a North Korea nuclear facility.

REFERENCES

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