Decommissioning Facility Characterization DB System

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1. Introduction

Basically, 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. In this paper, it is presented a computer system for the characterization of nuclear facilities, called DEFACS (DEcommissioning FAcility Characterization DB System). This system consists of four main parts: a management coding system for grouping items, a data input system, a data processing system and a data output system. All data is processed in a simplified and formatted manner in order to provide useful information to the decommissioning planner. For the hardware, PC grade computers running Oracle software on Microsoft Windows OS were selected. The characterization data results for the nuclear facility under decommissioning will be utilized for the work-unit productivity calculation system and decommissioning engineering system as basic sources of information.

2. Decommissioning Facility Characterization DB System

2.1 Objectives of the DEFACS

During the decommissioning projects for KRR-1 & 2 and UCP (Uranium Conversion Plant) at KAERI, an estimation of the amount of the dismantled waste and the relative project costs and the time schedule of the waste treatment were requested for the decommissioning project management. Unfortunately, how ever, at the time, there was no automatic computer system for the calculation of the quantities of the objects to be decommissioned. Also at the beginning of the decommissioning period, an accounting estimation of the objects for dismantling was not clearly detailed. For this reason, the establishment of DEFACS was developed. Using DEFACS, the calculated data for the decommissioning of KRR-1, KRR-2, and UCP are used as a reference for an initial estimation of the amount of data created in the decommissioning of object. The data from the DEFACS will be used for the decommissioning work-unit productivity calculation system and decommissioning engineering system as basic sources of information.

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 desk top 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 project 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.

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	DB/WEB server	CPU: Intel XEON E5520 2.26 HDD: 1 TB SATA RAM : 12G RDIMM
	Client	Client PC	CPU: Pentium series HDD: 40 GB RAM : 512 MB

2.3 System of the DEFACS

Characterization of data on nuclear facilities is managed using four sub-systems; a grouping of the items and its code management system, a data input system, a data processing system and a data output system. Four nuclear facilities have been objected of the system; KRR-1&2 (a research reactor), a uranium conversion plant (nuclear chemical plant), UF4 pilot plant and a North Korean nuclear facility (the 5MWe

research reactor). These four facilities were categorized and grouped according to the characterization of their objects, location, processing, scale, and properties. All items were allowed their own code. Among them, the codes of the KRR-1&2 and UCP facilities were managed considering their relation with the facility codes and WBS codes of the DECOMMIS system. The following Fig.1 shows the code management of the KRR-2 reactor components.

Fig. 1. The categorized items and its code

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. A photograph of the facility is also possible to be inputted into the system. Radiological data of the nuclear facility is able to be inputted into the system, as well but only the surveying results of the surface contamination along with the dose rate.

Fig. 2. The kinds of objected facilities & input system

The data, corrected through the input system, was processed by the output system to show the adequate variables for the required process. This process was designed to calculate the area, volume, and weight according to the shape, material properties, and density. The output system was composed of two types, one with a physical characterization field and the other with a radiological property field. The results of the output are summarized automatically according to the categorized lists and grouping items. The next picture in Fig.3 shows the results of the output. These results can be out put in Excel file types.

Fig. 3. The output system

3. Conclusion

For decommissioning projects, a characterization of the nuclear facility to be decommissioned is needed, and is very useful an estimation of the amounts of dismantling waste and the project costs. The function of this system is extended into the record keeping of nuclear facilities for the preparation of future projects, and as a data analysis for R&D. Through this DEFACS system, the results of the characterization data will be applied a decommissioning engineering system as basic information, and will also be used for an evaluation of the KRR-1&2 and UCP decommissioning projects. This system will also be helpful for a study on the decommissioning plans for a North Korean nuclear facility.

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