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 workunit 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		Browser	Internet Explorer 5.5					
	Server	DB	ORACLE (RDBMS					
		server	11g)					
		WEB	ORACLE					
		server	Application Server					
		301 / 01	10g					
		OS	Window 2008 Server					
		Middle	PL/SQL, Java, Jsp					
		ware	Net					
	Client	Browser	Internet Explorer 5.5					
		OS	Window 98					
Hard ware	Server		CPU: Intel XEON					
		DB/WEB	E5520 2.26					
		server	HDD: 1 TB SATA					
			RAM: 12G RDIMM					
	Client		CPU: Pentium series					
		Client PC	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.

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	r	KRR: 연구용원차로	K2R: 연구교2호기	K2R-POL: 수준내시설할지	POL-001	世北노십구조물				
	Г	KRR: 연구용평자로	K2R: 연구로2로기	K2R-POL: 수조내시설함치	P0L-002	Rotary specimen rack				
	r	KRR:世平書聖政星	K2R:연구분2호기	K2R-POL: 수프나타/교환지	POL-003	Fuel racks/Hanger type)				
	F	KRR: 연구暴毁功业	K2R: 연구료2표기	#28-POL: 수프내시설할지	POL-004	Fuel Storage rack(영향)				
	r	KRR: 연구물원자로	K29 : 연구로2호기	K2R-POL: 수휴내용사업장치	POL-005	Pneumatic rabbit system				
	r	KRR: 민구普班对星	KIR: 연구료2호기	K2R-POL: 수조내시설할치	P0L-005	Force Cooling Duct				
	r.	10月1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1	K2R:연구로2호기	129-POL: 4 31841 #371	POL-007	Imadiation Tube				
	-	KRR: NORWOR	K20:943.8283	K2R-POL: 0 3 4 4 4 5 11	POL-008	Irradiated Tube				

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.

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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.

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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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