

9-1 Rational Approach to Decommissioning of Nuclear Facility — Developing a Fast Method for Evaluating Decommissioning Cost —

Table 9-1 Relationship between dismantling methods chosen according to facility characteristics and evaluation items

Dismantling method	Evaluation item	Reactor	Nuclear fuel facility					Research facility			General facility
			Uranium treatment facility	Reprocessing related facility	MOX treatment facility	Waste treatment facility		Hot laboratory	Accelerator	Unsealed source treatment facility	
						$\beta \cdot \gamma$	TRU				
Decontamination before dismantling	System decontamination										
	Cell decontamination										
Dismantling of equipment (Metal)	of general equipment	Uncontaminated	○	○	○	○	○	○	○	○	○
		$\beta \cdot \gamma / U$ contaminated	○			○	○	○	○	○	○
		TRU contaminated		○		○					
	by heavily equipped	High radiation area	○		○		○	○			
		Low radiation area	○		○		○	○		○	
	of special equipment	Lining	○		○		○	○			
		Centrifuge		○							
		Large scale glove box				○					
		Small scale glove box			○	○					
		Block (metal)							○		
	by remote control	Dismantling in cell by robot			○				○		
		Dismantling in air	○							○	
Dismantling in water		○									
Dismantling of building and structures (concrete)	Structures	by remote control	○								
		Removal of block				○		○	○		
	Building	Removal by workers	○				○	○	○	○	
		Removal using heavy machine	○				○	○	○	○	
		Reinforced concrete	○	○	○	○	○	○	○	○	○
	Steel-frame slate		○							○	

The mark ○ denotes cost evaluation items for dismantling methods at nuclear facilities

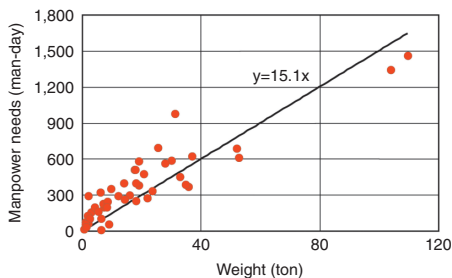


Fig.9-2 Relationship between manpower need and weight of equipment (General equipment ($\beta \cdot \gamma / U$))

We have various types of R&D nuclear facilities which will be eventually decommissioned with their missions completed. To implement decommissioning of these facilities, it is important to make a rational decommissioning plan from a long-term point of view.

The decommissioning cost of the facilities needs to be estimated in advance to develop such a long term plan. In evaluating decommissioning cost, detailed facility information is required in general such as weight of the equipment and contamination distribution in the facility, and the specific procedure of dismantling. However, it will take much time and effort to get such detailed plant information and to determine the procedure. Therefore, a method for evaluating decommissioning cost efficiently, even if the detailed information has not been obtained, needs to be developed. Here, one important issue is how to estimate the manpower required to dismantle the facility and equipment. Once the manpower need is evaluated, it will be possible to evaluate the cost of dismantling operations using unit labor cost, and other cost of decommissioning planning and work management.

Manpower need depends on the dismantling method, which is chosen according to the type of facility. Thus we

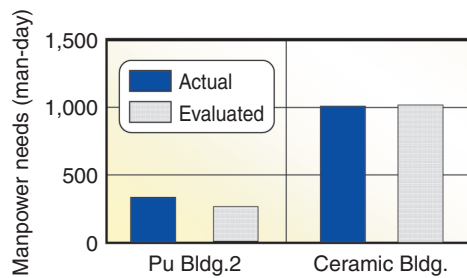


Fig.9-3 Comparison of evaluated and actually used labor

classified nuclear facilities into reactors, nuclear fuel facilities, research facilities, etc., and made the relationship between the dismantling method and each type of facility (Table 9-1). Manpower need depends on the weight of equipment to be removed, size of the operation area, and the dismantling method. Considering that there is a correlation between weight of equipment or floor area of building and manpower need, we constructed conversion coefficients from weight or area to manpower need by analyzing experienced real data of JAEA operations (dismantling of Japan Power Demonstration Reactor and partial remodeling of Reprocessing Plant). Fig.9-2 shows an example of analysis results of the relationship between manpower needs and weight of equipment. Then, we developed a method for rapidly evaluating decommissioning cost which would be applicable to various types of facilities and dismantling methods.

To verify this method, we applied it to two facilities using unsealed sources, Plutonium Research Building 2 (Pu Bldg.2) and Ceramic Research Building (Ceramic Bldg.). Fig.9-3 shows a comparison of evaluated results and actual data. There was good agreement between them, verifying the accuracy of this method.

Reference

Shiraishi, K., Tachibana, M., Ishigami, T. et al., Study on Cost Evaluation Methods for Decommissioning of Nuclear Facilities, JAEA-Technology 2007-057, 2007, 46p. (in Japanese).