8–1 Toward Public Use of the Decommissioning Cost Estimation Code DECOST
—Development of a Manual for the DECOST—

Table 8-1 Input datasheet example for estimating the dismantling cost using DECOST
The information required for estimating the dismantling cost includes the unit cost per worker, building information related to the dismantling of the facility, special equipment information for individually evaluating the work required, and waste-related information for calculating the total amount of work. In the manual, methods to obtain this information are explained and a summary datasheet is provided. Here, the necessary information acquired from the Japan Power Demonstration Reactor (JPDR) is summarized. JPDR was the first reactor in Japan to carry out nuclear power generation and was the first facility to demonstrate that we could dismantle and demolish a nuclear reactor.

	Input information	Data			Input information	Data			Input information	Data		
	Type of facility	Reactor			Accelerator shielding (Metal)	0	t		Concrete_CL	524	t	
	Consumption tax	3	%		Accelerator shielding (Concrete) by wire saw	0	t		Concrete_NR	19295	t	
Unit cost	Worker	XXXX	¥/man-day	Special equip.	Accelerator shielding (Concrete) by batch removal	0	t		Miscellaneous solid_L0	0	t	
	Manager of radiation management	XXXX	¥/man-day		Remote dismantling (Cell)	0 ¥ 0	n		Miscellaneous solid_L1	0	t	
	Manager of work management	XXXX	¥/man-day		Metal_L0	0	t		Miscellaneous solid_L2	2.4	t	
Building info.	Decontamination systems	0	n		Metal_L1	44	t		Miscellaneous solid_L3	7.9	t	
	Floor area of cell	0	m^2		Metal_L2	118	t		Miscellaneous solid_CL	0	t	
	Floor area of controlled area	23800	m^2		Metal_L3	78	t		Miscellaneous solid_NR	0	t	
	Floor area of building (steel slate)	0	m^2		Metal_CL	865	t		Casks	XXXX ¥ 19	n	
	Safe-storage period	0	year		Metal_NR	1324	t		$1m^3$ steel containers	XXXX ¥ 0	n	
Special equip.	Lining weight	23	t	Waste related info.	Concrete_L0	0	t		Drum (epoxy coatings)	XXXX ¥ 1125	n	
	Centrifuge weight	0	t		Concrete_L1	60	t		Drum (galvanized containers)	XXXX ¥ 0	n	
	Large sized GB weight	0	t		Concrete_L2	83	t		Drum (concrete linings)	XXXX ¥ 0	n	
	Small sized GB weight	0	t		Concrete_L3	1477	t		Flexible container	XXXX ¥ 1147	n	

To decommission a nuclear facility after serve its expected purpose, all equipment must be dismantled and all contamination by nuclear materials must be removed; the costs of such an operation must be estimated when developing a decommissioning plan. Therefore, in 2007, an estimation code was developed, the Simplified Decommissioning Cost Estimation Code for Nuclear Facilities (DECOST); this code can be applied to a wide variety of nuclear facilities and has been used in JAEA. This method allows you to easily estimate decommissioning costs based on the characteristics and similarities of facilities, dismantling methods, etc. Since 2017, all nuclear licensees in Japan are obliged to develop and publish a decommissioning plan of all their nuclear facilities before they go live, i.e., an initial decommissioning plan, by the law for the regulation of nuclear source material, nuclear fuel material, and reactors amended. The initial decommissioning plan must also include the estimated costs required for decommissioning. JAEA thus created and published a manual, in which how to use the cost estimation formulas and the required information for DECOST were summarized, for all nuclear licensees to estimate the dismantling costs of their various types of nuclear facilities with reference to DECOST. However, DECOST is still in the preparatory stage for public release from JAEA's website.

When using DECOST, the type of facility to be evaluated is first selected, where the cost items based on the facility type and the corresponding formulas are selected. Next, the user inputs the data required for the cost calculation, which includes the unit cost of workers, the building information of the facility, and the waste related information (hereinafter, input information) to calculate the cost of dismantling each item. In the manual, an overview of DECOST is provided, i.e., the dismantling costs estimation methods, and how to acquire and enter the input information. Nuclear facilities include facilities for various purposes such as nuclear reactors for testing and research, uranium-handling facilities, MOX handling facilities, and reprocessing facilities. Therefore, nuclear facilities are classified into 10 types in DECOST and each type has its own set of formulas, which are prepared by the same basic concept.

For this reason, the characteristics of each type of facility are described in the manual; further, each type of facility is associated with a JAEA facility for reference and to make it easier for the DECOST users to determine which of the 10 facility types the target facility falls under. Additionally, a table was created that allows users to easily select the required set of formulas to estimate the cost of dismantling the facility by simply selecting the type of facility.

The user must prepare up to 42 input information when estimating the dismantling cost using DECOST. Input information includes, for example, the total floor area of the controlled area and the amount of dismantled waste, classified by disposal type (e.g., radioactive or non-radioactive) and by materials (e.g., concrete or metal). Alongside the required datasheet for preparation of the input information, the manual provides a datasheet including data of the successfully dismantled facility JPDR as an input example so that it can be used as a reference for recording input information (see Table 8-1).

This manual was published in 2018 so that nuclear licensees other than JAEA can use it to create an initial decommissioning plan. Since then, four nuclear licensees have stated that they used the manual. When JAEA announced the initial decommissioning plan in January 2019, DECOST had been used to estimate the dismantling costs of nearly all JAEA-owned nuclear facilities. Future improvements to DECOST will include updating with the latest data on facility dismantling, here recently.

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Reference

Takahashi, N. et al., The User Manual of the Simplified Decommissioning Cost Estimation Code for Nuclear Facilities (DECOST), JAEA-Testing 2018-002, 2018, 45p. (in Japanese).