

Major Concerns of the Dismantling Project Schedule Development of Nuclear Power Plant

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1. Introduction

The Kori Unit 1, which has been permanently shut-down in June 2017, is the first nuclear power plant (NPP) dismantling project in Korea.

Unlike NPP construction projects with multiple performances, Kori Unit 1 dismantling project has some anticipation of hardship due to unprecedented.

Therefore different ways are needed from those of construction project in developing the schedule.

Hence this paper proposes methods for generation of activity and the estimation of the working period, which are major concerns of the dismantling project schedule development.

2. Main Discussion

The activity generation and the appropriate period calculation for the nuclear power plant dismantling should be preferentially performed to plan the whole project period. And to this, the following tasks are proposed step-by-step.

2.1 Evaluation of amount of dismantling work

In order to establish a dismantling schedule of nuclear power plant, a precise assessment for radiation source term and waste generation amount is required.

However, Kori unit 1 project has insufficient information available regarding dismantling project which includes drawings and other materials for estimating the amount of waste

Accordingly, the quantity survey for calculating the proper working period of the dismantling project has been analyzed based on the report issued for the Kori unit 1; the method and outcome of the radioactive sources terms and waste volume [1] etc.

The unit to calculate the amount of waste for estimating the working period per activity has referred UCF(Unit Cost Factors) of DeCAT[2] and AIFF/NESP-036[3].

2.2 Area dividing for dismantling work

When the decontamination/dismantling works are

carried out in many areas on the same floor of a building, frequent interfaces are anticipated among those areas.

In order to perform the work efficiently, it is considered whether the area division is applied to the same floor of a building, which has a multiple working areas. The related drawings, decontamination/ dismantling method and securing the moving space of equipment & and waste should be taken into accounts for the area division.

The object buildings of Kori Unit 1 for dismantling are Main Auxiliary, Intermediate and Turbine Building. Example of Turbine building area division is shown on the figure 1 as below.

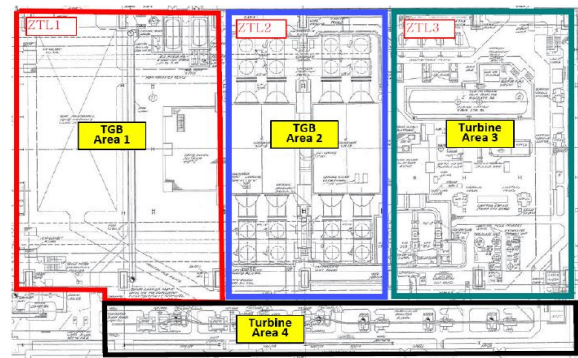


Fig. 1. Turbine building area division.

2.3 Evaluation work period based on integrated UCF

The dismantling period of each UCF has been calculated based on the amount of work per UCF in Kori unit 1.

The existing UCF concept has difficulties in schedule control because detailed tasks are individually divided into about 150 UCFs.

Integrated UCF concept has been applied to improve those issues in which similar UCFs are combined together.

Table 1. Generation of Integrated UCF

Integrated UCF	UCF	Integrated UCF	UCF
P&V	Piping/Valve etc	WCUT	Conc, Wire Cut etc
EQ	Equipment(Pump, Tank, Heat, Exchanger etc)	RVI	RVI etc

ELEC	Electrical(Cable, Tray, Conduit etc)	SG	Steam Generator
CRANE	RCB, TB, Other Crane etc)	PRESS	Pressurizer etc
HV	HVAC(Duct, HVAC Equip etc)	RCP	RCP etc
DISM	Decontamination/Dismantling(Building, Structure etc)	T&GEN	Turbine, Generator etc
SCAB	Scabbling etc	COND	Condenser etc

The working time of integrated UCF is the basis of each activity duration.

2.4 Estimate work period with added work difficulty Factor

The dismantling work requires additional working duration as well as the integrated UCF depending on the Work Difficulty Factor (WDF)[3].

○ Type and content of WDF

The five types of WDF will be based for additional working duration as below.

- ✓ Accessibility or Height Factor : To consider work difficulty in the need to work such as scaffolding, ladders, piping and confined spaces
- ✓ Respirator Factor : Related to protect the works from airborne contamination by using canister filter mask, etc.
- ✓ Radiation/ALARA Factor : To implement the administrative control and requirement to work in radiation area
- ✓ Protective Clothing Factor : The use of protective clothing, the associated procedural “suit-up”, controlled disposal of the clothing and the required exit frisking.
- ✓ Work Break Factor : The paid non-productive time, necessitated by agreement with labor for scheduled work breaks and predetermined intervals.

2.5 Dismantling activity generation for dismantling schedule and proper logic development

To generate an activity for the schedule analysis using P6 schedule software, the following concept has been applied

Schedule activity has been generated by PBS and integrated UCF.

Table 2. Generation method of Dismantling Activity

PBS(Area Group)	Integrated UCF	Remarks
321		
Main Auxiliary Building EL-34'-0''(LEVEL 1)	P&V, EQ, ELEC etc	1(PBS) to N(Integrated UCF)

- Major review points that need to be reflected in development of the project schedule
 - ✓ Milestone, Key dates for licensing and Project policy
 - ✓ Construction Logic based on construction method, considering construction sequences including decontamination and dismantling
 - ✓ Identification of the activities to be performed in parallel to reduce the time

3. Conclusion

This paper introduces a method for schedule development of NPP dismantling project; integrated UCF, area division on the bases of work quantity, concept of activity generation, work period calculation methodologies, and major review points.

By applying this approach, it is expected to improve the schedule reliability of the first dismantling NPP project of at Kori unit 1 in Korea.

REFERENCES

- [1] KEPCO E&C, Evaluation of Decommissioning Source Terms and Wastes for the Pressurized Water Nuclear Power Plant and Heavy Nuclear Power Plant, Final Report, 2016.
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