

The Regulatory Challenges of Decommissioning Nuclear Power Plants in Korea - 13101

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ABSTRACT

As of 2012, 23 units of nuclear power plants are in operation, but there is no experience of permanent shutdown and decommissioning of nuclear power plant in Korea. It is realized that, since late 1990's, improvement of the regulatory framework for decommissioning has been emphasized constantly from the point of view of International Atomic Energy Agency (IAEA)'s safety standards. And it is known that now IAEA prepare the safety requirement on decommissioning of facilities, its title is the Safe Decommissioning of Facilities, General Safety Requirement Part 6. According to the result of IAEA's Integrated Regulatory Review Service (IRRS) mission to Korea in 2011, it was recommended that the regulatory framework for decommissioning should require decommissioning plans for nuclear installations to be constructed and operated and these plans should be updated periodically. In addition, after the Fukushima nuclear disaster in Japan in March of 2011, preparedness for early decommissioning caused by an unexpected severe accident became also important issues and concerns. In this respect, it is acknowledged that the regulatory framework for decommissioning of nuclear facilities in Korea need to be improved. First of all, we identify the current status and relevant issues of regulatory framework for decommissioning of nuclear power plants compared to the IAEA's safety standards in order to achieve our goal. And then the plan is to be established for improvement of regulatory framework for decommissioning of nuclear power plants in Korea. After dealing with it, it is expected that the revised regulatory framework for decommissioning could enhance the safety regime on the decommissioning of nuclear power plants in Korea in light of international standards.

INTRODUCTION

As of 2012, 23 units of nuclear power plants are in operation in Korea, but design lives of 12 units will be expired by 2030. Especially, design life of Wolsong Unit 1 will be terminated in November of 2012 and now it is under examination of continued operation.[1, 2] Kori Unit 1 which is the first commercial nuclear power plant in Korea acquired an approval for continued operation in 2007. However, permanent shutdown and decommissioning issue of Kori Unit 1 became larger since the station blackout occurred in February of 2012.

Since the 1990s, it has been emphasized that the regulation on decommissioning of nuclear facility should be improved. In addition, preparedness for early decommissioning became necessary after Fukushima Daiichi nuclear disaster. In July of 2011, IAEA's Integrated Regulatory Review Service (IRRS) was inspected in Korea and it was recommended that the regulatory framework for decommissioning should require decommissioning plans for nuclear installations to be constructed/operated and these plans should be updated periodically.[3] Therefore, imperfection of the current regulatory framework should be analyzed and plans

should be established in order to improve the regulatory framework for decommissioning of nuclear facilities in Korea.

IMPERFECTIONS OF CURRENT REGULATORY FRAMEWORK

The current regulatory procedure of decommissioning in Korea is shown in Figure 1. Comparing this to IAEA’s safety standards[4, 5, 6, 7] and regulatory frameworks of major nuclear countries, inadequate items of the current regulatory framework were drawn as follows:

- Absence of legal definition of “Decommissioning”
- Incomplete procedure for safety regulation after permanent shutdown
- Incomplete acceptance criteria for Decommissioning Plan
- Incomplete requirements for early establishment and periodic revision of Decommissioning Plan
- Incomplete details on entered items of Decommissioning Plan
- Incomplete radiological standard for site reutilization after decommissioning

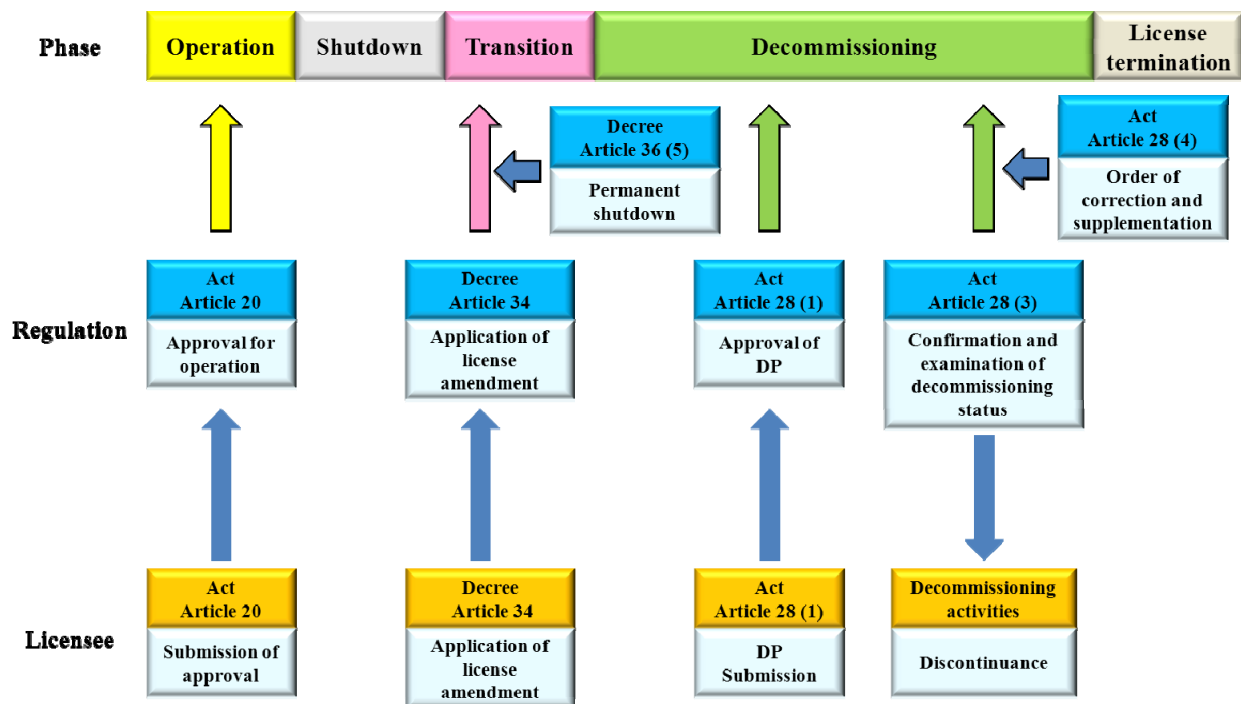


Fig. 1. Regulatory procedure of decommissioning in nuclear power plant

PRINCIPLE OF IMPROVEMENT

Lifecycle of nuclear facilities will be classified into three stages in order to consider decommissioning-related issues through the whole lifecycle. Three stages consist of pre-decommissioning, decommissioning and post-decommissioning stage (Table I and Figure 2).

TABLE I. The Classification of Decommissioning Stage during the Lifecycle of Nuclear Facility

Decommissioning Stage	Description
Pre-decommissioning	Construction and operation of nuclear facility, permanent shutdown, transition stage ⁱ
Decommissioning	Actual operation and activities of decommissioning
Post-decommissioning	Period between completion of decommissioning and license termination

ⁱ Transition Stage: Period between permanent shutdown of nuclear facility and commence of decommissioning activities

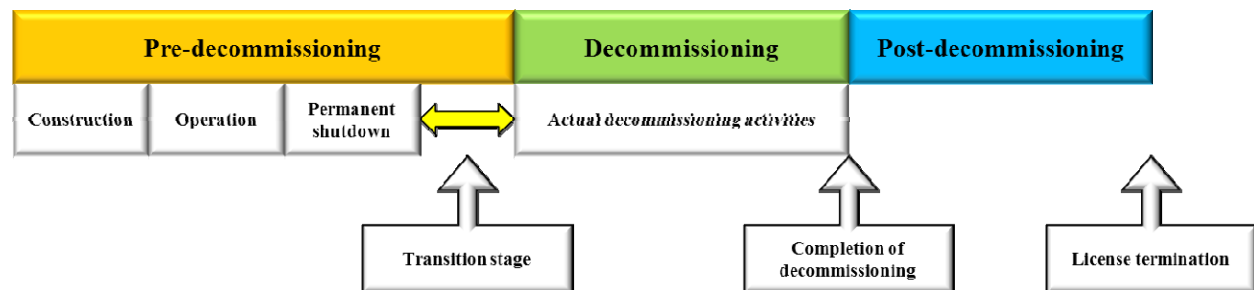


Fig. 2. Decommissioning stages of improved regulatory framework

Improvements of each stage were developed in order to improve the imperfections of the current regulatory framework in the above (Table II). Requirements and technical standards of each stage will be developed. Hence, safety regulations on decommissioning will be consistent for each stage.

TABLE II. Improvement of Regulatory Framework in the Decommissioning Stage of Nuclear Facility

Decommissioning Stage		Description
Pre-decommissioning	Construction and operation	<ul style="list-style-type: none"> - Definition of “Decommissioning” - Obligation of DP (Decommissioning Plan) submission - Periodic revision of DP
	Permanent shutdown, transition stage	<ul style="list-style-type: none"> - Detailed regulation on the application of license amendment for permanent shutdown
Decommissioning		<ul style="list-style-type: none"> - Detailed regulation on the submission and approval of DP
Post-decommissioning		<ul style="list-style-type: none"> - Regulation on the completion of decommissioning or license termination
etc.		<ul style="list-style-type: none"> - Design requirements facilitating decommissioning - Disclosure of information and public involvement

CONCLUSION

The imperfections of the current regulatory framework for decommissioning of nuclear facilities in Korea were studied and improvements of the regulatory framework for each decommissioning stage were established.

Case study on the decommissioning regulatory frameworks of major nuclear countries will be performed in further study. Also, detailed improvements for the regulatory framework will be established. Therefore, fundamental data for developing the technical standards and revising the corresponding legislation will be organized. By improving the regulatory framework for decommissioning, decommissioning-related system in Korea will meet the international standards and safety on decommissioning will be enhanced.

REFERENCES

1. Operational Performance Information System for Nuclear Power Plant, <http://opis.kins.re.kr/>
2. H. Kim, Decommissioning Operator's Effort for Preparing Decommissioning of Nuclear Facilities, 16th Nuclear Safety Information Conference, 2012
3. IAEA, Integrated Regulatory Review Service Report Draft, 2011
4. IAEA, General Safety Requirement Part 1, 2010
5. IAEA, General Safety Requirement Part 5, 2009
6. IAEA, WS-R-5, 2006
7. IAEA, General Safety Requirement Part 6 Draft, 2012

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