The regulatory framework improvement for safe decommissioning of nuclear power plants in Korea

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ASTRACT

We are having 24 units of nuclear power plants in operation. However, we don't have any experience on shutdown permanently and decommissioning of nuclear power plants. There are only two research reactors being decommissioned since 1997. We have started the regulatory framework improvement for safe decommissioning of nuclear power plants after the IAEA IRRS mission to Korea in 2011. And then Nuclear Safety Act[1] was revised and announced in January 2015 and would become effective in July 2015. The improvement has been carried out on the basis of the IAEA GSR Part 6[2].

KHNP (Korea Hydro & Nuclear Power Co. Ltd), the operator of nuclear power plants in Korea, decided and announced in June 2015 that Kori unit 1, the first commercial nuclear power plant in Korea, would be shutdown permanently in 2017 and then decommissioned based on the recommendation of government. KHNP would have set up plans for the preparation of permanent shutdown and decommissioning. It is also realized that the regulatory framework should be more elaborated for preparation of decommissioning of Kori unit 1. The preparation for decommissioning from the regulatory standpoint should be needed to maintain the safety during the transition period and for decommissioning.

INTRODUCTION

We are having 24 units of nuclear power plants in operation as of November 2015. There are two old research reactors being decommissioned since 1997. Before the IAEA IRRS mission to Korea in 201 and Fukushima nuclear accident in Japan, Korean has focused the operation of nuclear power plants. In the previous regulations for decommissioning, if the operator intends to decommission a nuclear power plant, it has to submit a decommissioning plan to obtain approval from the regulatory body prior to the start of decommissioning activities. However, based on the recommendation of IAEA IRRS and comparison with the IAEA safety standard [2], the plan has been established for improvement of regulatory framework for decommissioning of nuclear power plants in Korea. Matters on nuclear safety regulation and radiation protection are stipulated in the Nuclear Safety Act (NSA) in Korea. Before the completion of improvement of NSA and relevant regulations for decommissioning of nuclear power plants, KHNP has decided and announced in June 2015 that Kori unit 1, the first commercial nuclear power plant in Korea, would be shutdown permanently in 2017 and then decommissioned based on the recommendation of government. It was realized that the regulatory framework for decommissioning should be established properly soon.

IMPROVEMENT OF REGULATIONS

We have identified the current status and relevant issues of regulatory framework for decommissioning of nuclear power plants compared to the IAEA safety standard [2]. It was founded that some provisions would be needed and revised for making sure that the regulations for decommissioning would be in the light of international standards and clear. For instance, there was not the definition of decommissioning and requirement for initial decommissioning plan and periodic update of initial decommissioning plan, etc.

The table 1 shows the revision history of NSA and relevant regulations for decommissioning. The revised NSA has been effective after 21 July 2015.

Table 1. Revision history of NSA for decommissioning

Legislation	Date	Revision History
Nuclear Safety Act	20th Jan. 2015	Partial amendment & promulgation
	21st Jul. 2015	Enforcement (from 6 months later after proclamation)
Enforcement Decree and Regulation of NSA	19th Mar. 2015	Nuclear Safety and Security Commission passed the draft revision on Enforcement Decree and Regulation of NSA
	25th Mar. 2015	Pre-announcement of draft revision on Enforcement Decree and Regulation of NSA (Mar. 25 ~ May 4)
	20th Jul. 2015	Amendment and promulgation of Nuclear Safety Enforcement Decree
	21st Jul. 2015	Amendment and promulgation of Enforcement Regulation of NSA & enforcement of Nuclear Safety Act

The revised NSA and regulations has the definition of decommissioning. Decommissioning means all actions or measures taken to exclude any facilities licensed or designated pursuant to NSA from the scope of application of NSA through removal of the facility and the site or through decontamination thereof after permanent cessation of the operation of the facilities (hereinafter referred to as "permanent shutdown") by those who have been granted pursuant to Article 20(1), 30-2(1), and those who have been granted the designation pursuant to Article 35(1) or (2). According to the revision of NSA and relevant regulations, there are some different requirements compared to the previous regulations for decommissioning. For instance, they are as follows.

(1) The initial decommissioning plan shall be submitted as one of application document at the stage of construction permit and operating license of nuclear power plant. And the initial decommissioning plan shall be updated every 10 years during the operation.

(2) The operator shall submit the final decommissioning plan, quality assurance program for decommissioning, and the public consultation records for the approval of decommissioning within 5 years after the permanent shutdown.

(3) During the decommissioning, the licensee shall report the decommissioning status to the regulatory body by semi-annually. The regulatory body has to review the report and conduct the inspection as per the final decommissioning plan and semiannual report.

(4) At the completion of decommissioning activities, the licensee shall submit the decommissioning completion report with final site status report to the regulatory body. The regulatory body has to review the report and conduct the inspection as per the final decommissioning plan, decommissioning completion report, and final site status report. And then regulatory body shall notify the operator of the NPP of its termination of the operating license based on the inspection results.

The revisions of NSA and relevant regulations have been done based on the IAEA safety standards [2]. The figure 1 shows the overall regulations for decommissioning. In the figure 1, the NSSC Notice could provide the detailed technical standards for decommissioning. For instance, the Notice of the standard format and content of decommissioning plan has been developed based on the IAEA safety standards [3].

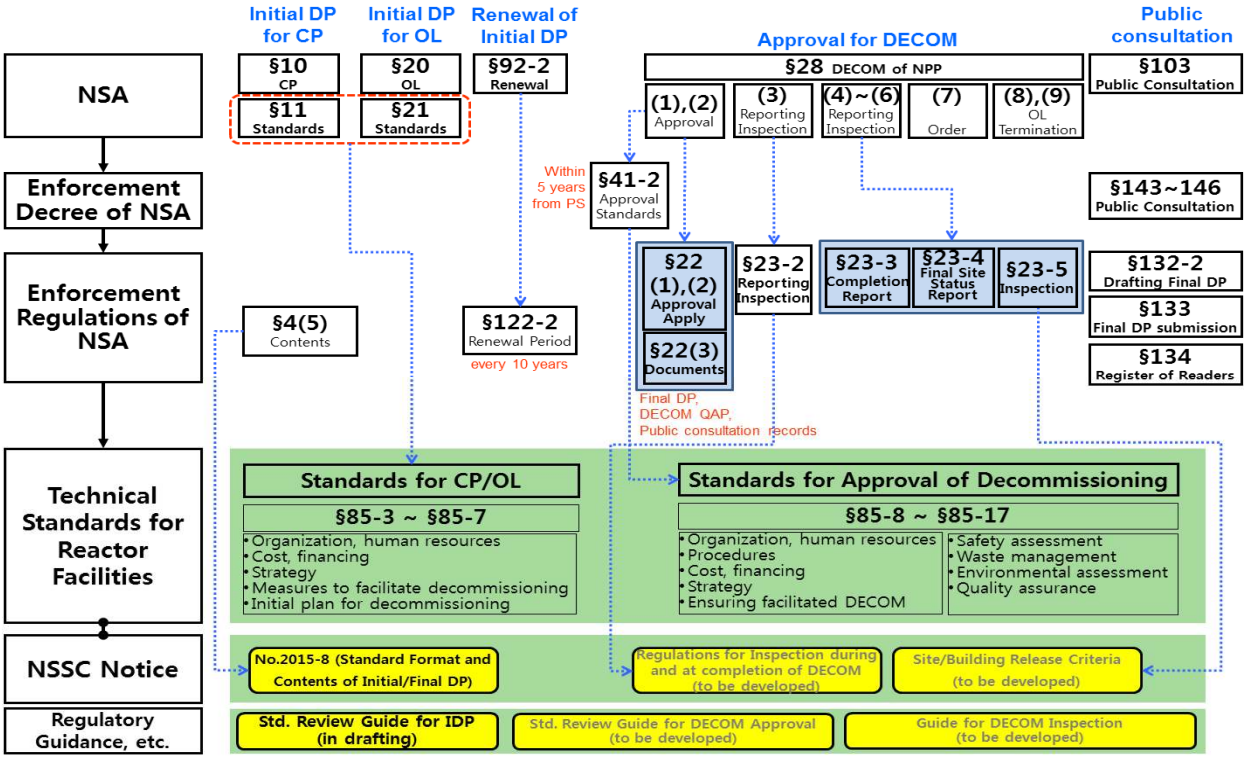

Figure 1 Overall provisions and regulations for decommissioning

However, the additional detailed technical standards should be developed in the future for decommissioning. For example, they are related with the inspection during decommissioning and at completion of decommissioning and the site release criteria for unrestricted and/or restricted use after completion of decommissioning.

Even though there have been some experiences in decommissioning of research reactors, it is realized that it is better to develop the regulatory guides on safety review and inspection for the decommissioning of nuclear power plants. Therefore, after the development of detailed technical standards, the regulatory guides would be developed subsequently.

The operator shall obtain the license change for the permanent shutdown of nuclear power plant. In order to reach the permanent shutdown of nuclear power plant, the license change shall be required in advance. The operator shall submit the relevant documentations such as DSAR (Defueled Safety Analysis Report), etc. for application of the license change. It is also realized recently that the transition period has been considered very important for preparation for decommissioning and assuring of nuclear power plant safety before the start of decommissioning. The regulatory guide for the transition period has not been clear and detailed. It should be more elaborated in the near future for preparation for permanent shutdown of Kori unit 1.

FUTURE WORK

From the aspects of regulatory framework for decommissioning of nuclear power plant, the revisions of NSA and relevant regulations for decommissioning have been done successfully based on the IAEA safety standards. We have thought that this was the first step for the improvement of regulatory framework on the safe decommissioning. The next step would be the development of detailed technical standards and regulatory guides on decommissioning. Those would be necessary for preparation for decommissioning and developed in a timely manner.

References

[1] Republic of Korea, “Nuclear Safety Act”, 2015

[2] IAEA GSR Part 6, “Decommissioning of Facilities”, 2014

[3] IAEA Safety Report Series No. 45, “Standard Format and Content for Safety Related Decommissioning Documents”, 2005