

Consideration of Regulatory System for Decommissioning of Nuclear Facilities in the United States of America and Japan

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1. Introduction

In Korea, twenty units of nuclear power plant are operating at present and especially Kori Unit 1 and Wolsung Unit 1 beyond twenty years. Usually it takes several years for operators to prepare the long-term decommissioning strategic plans of their own facilities before starting decommissioning, and also for regulator to revise the Atomic Energy Act and its regulations, which are the basis of operators' activities. In the light of this situation, it is time that we are going to check and, if necessary, to enhance the domestic regulatory institutional system for decommissioning of nuclear facilities. Of course, a lot of studies of the safety and costs for decommissioning have been carried out in domestic, but the study on the regulatory institutional aspects is less enough than them.

At the Spring Proceedings of the Korean Nuclear Society in this year, the status of regulatory system for decommissioning of the EU countries, such as France, Germany and the United Kingdom, was presented.

In this paper, the results of survey and analysis of the regulatory system for decommissioning of the United States of America (USA) and Japan is described. This will be also useful in developing of the direction of enhancement in our own system.

2. Safety Regulation on Decommissioning in the United States of America and Japan

2.1 Definition of Decommissioning

In the USA Title 10 of the *Code of Federal Regulations*, Section 50.2 (10 CFR 50.2) defines decommissioning as the safe removal of a facility from service and reduction of residual radioactivity to a level that permits: release of the property for unrestricted use and termination of the NRC license, or release of the property under restricted conditions and termination of the NRC license.

In Japan, though there is no legal definition of definition, the subcommittee of Nuclear Safety Commission defined the decommissioning as dismantlement of the facilities after the final shutdown of a nuclear power plant which has finished its role to make the state of facilities safe. Recently, the removal of nuclear fuels from the reactor vessel after the permanently shut down became to be included in the concept of decommissioning since the concerned articles of the Nuclear Reactor Regulation Law and Rules were amended in December 2005.

2.2 Statutory Procedures for the Decommissioning

In the USA and Japan, it is common to issue no specific license for decommissioning. Also, the regulatory process for decommissioning of both countries can be divided as 3 stages, such as a stage before the start of decommissioning, decommissioning stage, and the last stage following completion of decommissioning.

1) Regulatory Process before decommissioning

In the USA, Each power reactor licensee shall at or about 5 years prior to the projected end of operations submit a preliminary decommissioning cost estimate. Once the licensee's decision is made to permanently cease operations, the licensee must notify the NRC, in writing, within 30 days. The licensee must remove the fuel from the reactor and submit a written certification to the NRC confirming its action. The licensee submits Post-Shutdown Decommissioning Activities Report (PSDAR) to the NRC and the affected State(s) within 2 years of permanent cessation of operations. After receiving a PSDAR, the NRC notices the PSDAR in the Federal Register to make it available for public review and comment, and holds a public meeting in the vicinity of the plant to discuss it. The NRC approval of the PSDAR is not required. However, should the NRC determine that the informational requirements of the regulations are not met in the PSDAR, the NRC will inform the licensee in writing of the deficiencies and require that they be addressed before the licensee initiates any major decommissioning activities. Upon completion of the required submittals, and allowing for a 90-day waiting period after submittal of the PSDAR, the licensee may commence major decommissioning activities. Decommissioning activities conducted without specific prior NRC approval. Within 2 years following permanent cessation of operation, licensees are also required to submit for review and preliminary approval a description of how they intend to manage and provide funding for the management of irradiated fuel until title to the fuel is transferred to the Department of Energy (DOT).

In Japan, the licensee should submit the Decommissioning Plan to the Nuclear Industry Safety Agency (NISA) to get an approval of it before the start of decommissioning of a nuclear power plant. In addition, the licensee should submit the amendment of the approved safety rule to NISA to approve. Then NISA reviews the decommissioning plan and the amendment of the Safety Preservation Rules, and approves them, if they meet the criteria defined in the Ministerial Rules. The licensee can start decommissioning activities after the approval of the decommissioning plan by NISA. The concept of decommissioning includes removal of spent fuel from the nuclear power plant and bringing to reprocessing facilities after the termination of operation. The standards process from the termination of operation to dismantling and demolition is the "Safe Storage, then Dismantling and Demolition" method, in which nuclear power plants are closed after the removal of spent fuels and system decontamination, maintained for an appropriate period for safety storage, and then dismantled and demolished.

2) Regulatory Process under decommissioning

In the USA, three types of regulatory inspections will be conducted: core, temporary instruction compliance, and discretionary. The licensee submits the License Termination Plan (LTP) within 2 years of requesting license termination. The NRC notices the LTP in the Federal Register, and holds a public meeting to discuss the LTP. The NRC approves the LTP by amending the license. The licensee performs remaining decommissioning activities. Decommissioning must be completed within 60 years.

In Japan, the periodic inspection, which is annual inspection, will be no more conducted after the approval of the decommissioning plan. But the safety inspection, which is an inspection of the Safety Preservation Rules observance status, will be continuously conducted during the decommissioning. The number of safety inspection in the normal operation a year is 4 times, and the frequency of the inspection will be reduced, responding to the proceeding of decommissioning.

3) Regulatory Process after decommissioning is completed

In the USA, the licensee should submit the Final Status Survey Report (FSSR) to NRC. NRC reviews and approves it. In addition, NRC performs confirmatory surveys and terminates a license. In Japan, the licensee should submit the regulatory confirmation of the Final Decommissioning Report to NISA. NISA reviews and approves the final decommissioning report. Following the approval of the report by NISA, the license will be terminated.

2.3 Contents of Safety Documents to be submitted to the Regulatory Body in the Licensing Process and Acceptance Criteria

In the USA, the contents of PSDAR include a description and schedule for the planned decommissioning activities; an estimate of the expected decommissioning costs; and a discussion that provides the means for concluding that the environmental impacts associated with the decommissioning activities will be bounded by appropriately issued EISs. The contents of LTP include site characterization information; identification of remaining dismantlement activities; plans for site remediation; detailed plans for the final radiation survey; a description of the end use of the site, if restricted; an updated site-specific estimate of remaining decommissioning costs; and a supplement to the environmental report describing any new information or significant environmental change associated with the licensee's proposed termination activities.

The License Termination Standards for Unrestricted Release and for Restricted Release are as follows;

License Termination Standards for Unrestricted Release (10 CFR 20.1402)	License Termination Standards for Restricted Release (10 CFR 20.1403)
<ul style="list-style-type: none"> Total Effective Dose Equivalent (TEDE) \leq 0.25 mSv/a and As Low As is Reasonably Achievable (ALARA) Average member of the critical group All pathways Period of performance - 1000 years 	<ul style="list-style-type: none"> \leq 0.25 mSv/a TEDE and ALARA, with institutional controls in effect Legally enforceable institutional controls If institutional controls fail, doses do not exceed 1 mSv/a, or 5 mSv/a, under specific circumstances Financial assurance - independent third party Licensee and NRC public input/outreach requirements

NRC will terminate the license if it determines that the remaining dismantlement has been performed in accordance with the approved the LTP, and the final radiation survey and associated documentation demonstrates that the facility and site are suitable for release in accordance with the LTR (License Termination Rule).

In Japan, the contents of the Decommissioning Plan include facilities being dismantled and the dismantlement method; management and transfer of nuclear fuel materials; removal of contamination with nuclear fuel materials; and disposal of nuclear fuel; materials and contaminated materials with nuclear fuel materials and etc. The contents of the Final Decommissioning Report include description of dismantlement of NPP facilities; description of nuclear fuel material transfer; Description of nuclear fuel material decontamination; and Description of disposal of radioactive materials and etc. Approval standards of the Decommissioning Plan and confirmation standards of the Final Decommissioning Report are as follows;

Approval standards of the Decommissioning Plan (Ministerial Rules, Article 19-9)	confirmation standards of the Final Decommissioning Report (Ministerial Rules, Article 19-11)
<ul style="list-style-type: none"> Completion of spent fuel removal from NPP reactor core Appropriate management and transfer of nuclear spent fuel Appropriate management, handling and disposal of radioactive materials The decommissioning plan should be appropriate for preventing the disaster due to radioactive materials and reactor 	<ul style="list-style-type: none"> Completion of nuclear fuel material transfer Soil and remaining facilities in the decommissioning site are free from preventive measures of radiation hazard Completion of disposal of radioactive materials

3. Conclusion

The regulatory systems for decommissioning of the USA and Japan were surveyed and analyzed. Various different features of licensing type, regulatory process, and safety documents to be prepared in decommissioning are found.

However, some major items are common to ensure the safety during the each stage of decommissioning. For examples, there are approval of the decommissioning plan (or, PSDAR in the USA) before start of decommissioning activities, regulatory inspections during decommissioning, confirmation survey after completion of decommissioning activity, and termination of license. They will be useful to enhance domestic regulatory system for decommissioning.

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