

Comparative Study on Application Method and Timing of Decommissioning Quality Assurance Program for Nuclear Power Plant

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1. Introduction

Korea's Kori Unit 1 nuclear power plant is currently in a permanent shutdown, and is scheduled to be decommissioned from the time the permit documents such as the final decommissioning plan are approved. DQAP(Decommissioning Quality Assurance Program) is also included in the license document for decommissioning, and DQAP should contain the basic requirements for the overall power plant activities necessary for safe dismantling.

To this end, in the previous study, there was a case study that compared the regulatory requirements of each country regarding the preparation of DQAP and application of requirements, and examined the differences in the requirements to be applied according to the decommissioning stage. [1] This study compares how different DQAPs are prepared for each country according to the requirements that are differentially applied at the dismantling stage, and compares how the criteria for dividing stages are different.

2. Comparison of Related Laws

2.1 United States

- 10 CFR Part 50.82 Termination of License

This Article provides for matters related to the termination of the licensee's operating permit, and when the licensee intends to permanently stop the power plant, an application for permission satisfying the requirements of 50.4 (b) (8) must be submitted to the NRC within 30 days. In addition, after the permanent removal of nuclear fuel from the reactor vessel, it is stipulated to submit a permit application under 50.4 (b) (9) to the NRC.

- 10 CFR Part 50.4 Written Communications

This article stipulates the documents to be submitted by the licensee and should be documented and submitted to the NRC in (b) (8). In addition, in (b) (7), changes to the quality assurance plan are required to be reported to the NRC.

- 10 CFR Part 50.54 Conditions of License

This article provides for the terms of the permit. With regard to decommissioning quality assurance, when changes to the quality assurance plan or changes to the QAP Description included in the safety analysis report

occur, the NRC should be reviewed and approved whether the existing commitments have been inhibited along with a description of the changes. In the event of a permanent suspension or a change to the DQAP, it means that the change must be approved by the NRC based on this article (a) (4).

- 10 CFR Part 50.71 Packaging and Transportation of radioactive material, Subpart H

- 10 CFR Part 50.72 Licensing Requirements for the Independent storage of spent nuclear fuel, high radioactive waste, and reactor-related greater than class C waste, Subpart G

This article provides for the transport and disposal of radioactive waste. Subpart H of 71 and subpart G of 72 respectively define quality assurance requirements, and the same applies to the treatment of radioactive waste generated during decommissioning.

As discussed above, the statutes in a large extent affecting the quality assurance plan in relation to permanent shutdown and decommissioning of nuclear power plants are as above, and the mutual impact relationship of each statute in terms of quality assurance is as follows.

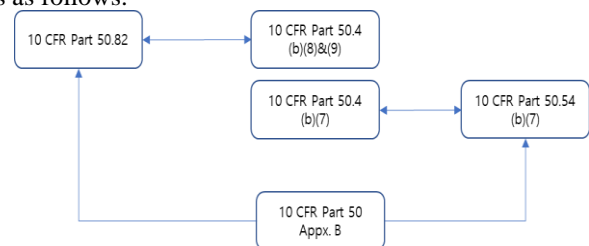


Fig. 1. Correlation Chart between DQAP related laws(USA)

2.2 Korea

- Nuclear Safety Act Article 28 Decommissioning of Nuclear Power Reactors and Relevant Facilities

In order to dismantle the power generation reactor, this article requires that licensee must obtain approval in accordance with Enforcement Decree and submit documents prescribed by enforcement regulation.

- Enforcement Decree of the Nuclear Safety Act 41 2 Filing Applications, etc. for Approval to Decommission Reactor Facilities

This provision stipulates that an applicant for permission to dismantle must submit a request for dismantling approval within 5 years after receiving permission to change the permanent suspension, and the

technical capability for dismantling is determined by the rules of the Nuclear Safety and Security Commission.

- Enforcement Regulation of the Nuclear Safety Act Article 22 Application for approval to dismantle nuclear reactor facilities

In order to obtain approval for the dismantling of nuclear reactor facilities, Paragraph 3, Paragraph 1 of this article requires that a quality assurance plan for dismantling be submitted.

- Rules for technical standards of nuclear reactor facilities, etc. Article 85 17 2

This article stipulates that article 68-85 of the Rules on Technical Standards of Reactor Facilities, etc. shall be applied when preparing DQAP.

- Rules for technical standards of nuclear reactor facilities, etc. Article 68-85

The 18 requirements for nuclear quality assurance are described in this article.

The following is a schematic diagram of the Korean legislation system that stipulates the requirements for quality assurance related to the dismantling of nuclear power plants.

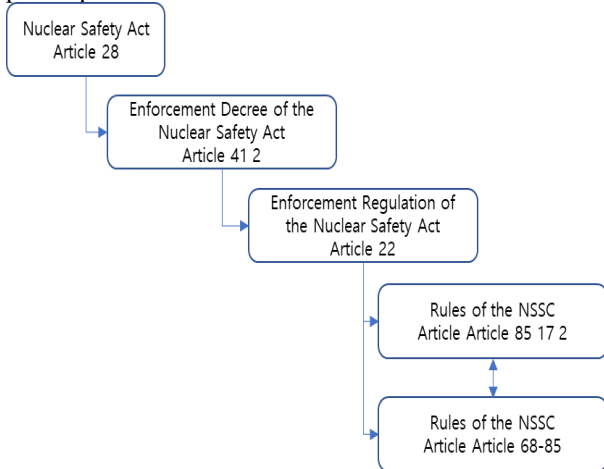


Fig. 2. Correlation Chart between DQAP related laws(KOR)

3. Comparison of application of quality assurance requirements in the dismantling process

3.1 Comparison of the decommissioning quality assurance system in Korea and the United States

In the previous chapter, we looked at the interrelationship between the laws and regulations that apply when decommissioning nuclear power plants. As shown in Fig. 1 and 2, it can be seen that although they differ in the legal system, there are no significant differences in the types of documents to be decommissioned and the requirements to be reported to regulatory agencies. However, the difference between

the DQAP of the nuclear power plant, which is already being dismantled in the United States, and the quality assurance plan of Kori Unit 1, which is currently the first to be carried out in Korea, reveals the difference. In fact, Kori Unit 1 is currently in a permanent suspension and is in preparation for decommissioning, so it cannot be said that there is an exact difference, but the contents of the quality assurance plan of the nuclear power plant already underway in the United States and the Korean law Looking at the types of permit documents that are applied systematically, the differences can be guessed to some extent.

According to the contents of DQAP [2][3][4] Revision 0 and Revision 5 of SONGS(San Onofre Nuclear Generating Station) in the United States, the United States begins to apply DQAP when the permanent suspension is approved, and then continues to update the DQAP according to the phase of dismantling. However, Korea does not apply a separate DQAP even after approval for permanent suspension. Instead, only the permission to change the existing driving QAP is approved and continues to be applied. DQAP is required to be applied at the time of approval for dismantling. This does not require the submission of a separate quality assurance plan to the Korean legislation system that was previously reviewed at the permanent stop stage. If only the update to the quality assurance manual described in chapter 17 of the safety analysis report is performed, the existing operation quality assurance plan is applied. It is because it can be applied as it is.

The difference between the application of the DQAP in the United States and Korea is illustrated below.

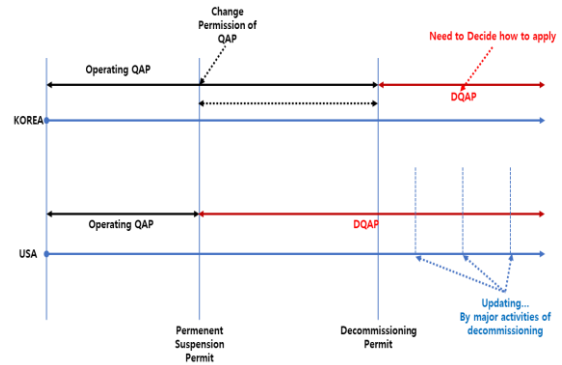


Fig. 3. DQAP application difference according to the time of approval(KOR vs USA)

As shown in the figure above, the application of DQAP can be divided into two stages: approval of permanent suspension and approval of decommissioning plan. In the United States, DQAP is applied from the end of the permanent stop approval stage, but the DQAP is updated in accordance with major processes (eg, nuclear fuel withdrawal) that occur during the decommissioning process. In addition, if the withdrawn nuclear fuel is transferred to a dry storage facility or an intermediate storage facility, it has been

documented to comply with the statutes already in place, while Korea has classified documents that are applied according to the time of permit, The legal basis has not been established yet.

3. Proposal of Application Method in Kori 1 Decommissioning

As mentioned above, because the US and Korea have different legal systems, the method of applying the quality assurance plan at the dismantling stage may be different. However, Korea is now preparing to approve the dismantling of Gori Unit 1, and DQAP has not been officially developed. Therefore, based on the U.S. system, Korea can apply two options. The first is to create a DQAP first like the United States, and then change the contents of the DQAP according to the main stages of dismantling like the United States and obtain a change permission accordingly. In reality, Korean law requires that all 18 DQAP requirements be complied with for nuclear power quality assurance requirements. Therefore, when applying for dismantling permits, a method of applying all 18 requirements will be required. After that, it is a method to update the new DQAP by excluding unnecessary requirements for each stage of disassembly or export of major equipment that may potentially cause nuclear fuel withdrawal or radiation. This has the advantage of being able to identify and respond to phenomena whenever an event occurs, as there is a possibility of multiple occurrences during the decommissioning phase in Korea, which has not yet had experience in decommissioning. There will be difficulty in setting new standards every time. Another method is to describe all 18 requirements in the same way as in the first, but to DQAP in advance to subdivide the application requirements according to the main dismantling process. This method can reduce the difficulty of obtaining continuous change permits depending on the dismantling process, but it is necessary to consult with regulators and related agencies in advance as to what criteria to decide the main process of dismantling and what requirements to apply for each process. It must be completed to be able to write. It is a fact that DQAP should be applied in stages in any way as there is a wide range of consensus that any method has advantages and disadvantages, and that a graded approach and application are necessary during the dismantling process. Therefore, the licensee can consider the environment of the power plant to be dismantled and consider various considerations for the application of DQAP, and through consultation with regulators and related organizations, DQAP applied to Korea can guarantee safety during the dismantling process and operate efficiently. It will be necessary to establish a foundation system that can be done, and the government agencies in charge of regulation and others will have to work hard to establish legislative and accurate guidelines to support this.

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