

The Regime of Spent Nuclear Fuel Management in Korea: Focused on the Licensing Process

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1. Introduction

In June 2015, the Public Engagement Commission on Spent Nuclear Fuel Management submits the recommendations for Spent Nuclear Fuel (SNF) management. It recommends a site for Underground Research Laboratory (URL) will be selected in 2020. [1] The government was composed of SNF management general plan task force in August 2015 and is scheduled to establish a management general plan in the second half of this year.

During the last two decades, the government has failed to site selection a Low and Intermediate Level Waste (LILW) disposal repository in the face of vehement opposition from the potential host sites. If the governments do not want to repeat the mistakes in the past, the government investigated the other countries licensing process concerning SNF disposal facilities and it is desirable to formulate licensing process suitable for the situation in Korea.

This paper presents future direction of domestic licensing process for SNF disposal facilities based on licensing processes of Sweden and Finland, respectively, that successfully siting SNF disposal repository.

2. Licensing process for SNF disposal facilities

Sweden and Finland are pursuing similar technology and time schedules for repository development. In both countries SNF will be disposed of directly without reprocessing. Two countries were carried out suitable licensing process in each and successfully selected site of SNF disposal repository. This chapter present the improvement of domestic licensing process based on the example of two countries.

2.1 Sweden

The Swedish Nuclear Fuel and Waste Management Co. (SKB), is jointly owned by the Nuclear Power Plant (NPP) utilities (Barsebäck Kraft AB, Ringhals AB, Forsmark Kraftgrupp AB and OKG AB) and is responsible for management, including transport, and disposal of SNF. [2] The SNF from the NPPs is temporarily stored in fuel pools and then transported to the central interim storage facility for SNF (Clab), where it will be stored for at least 30years before being encapsulated and deposited in a disposal facility.

The applications for a repository for SNF have been submitted to the Land and Environmental Court and to the Swedish Radiation Safety Authority (SSM). The Land and Environmental Court will prepare the case, review it under the Environmental Code and will hold a main hearing. After the Court hearings, the Court will submit a statement to the Swedish Government on the license applications and recommend a decision. The Government will request statements from the municipalities of Östhammar and Oskarshamn. The municipalities will accept or reject the project and have a right of veto. The Government will then make a decision on whether the final disposal system is permissible or not. If the application is approved, the Land and Environmental Court will hold a new hearing. Thereafter, the Court will grant permits and stipulate conditions pursuant to the Environmental Code. The SSM will prepare the case in accordance with the Act on Nuclear Activities (1984:3) and the Government will grant a permit. The Government grants the permit to the SSM, which will stipulate the conditions.

Since March 2011, SSM has reviewing SKB's license applications for an encapsulation plant and a deep geological repository for the final disposal of spent nuclear fuel. The SSM evaluated a broad review of all primary licensing documents in the initial licensing review phase, and the SSM evaluates currently SKB's choice of method and site to ascertain that the proposed repository system is feasible in the main review phase. Depending on the capacity of SKB to submit essential complementary information that has been requested for the continued compliance evaluation in the ongoing main review phase, SSM's review plan is to submit a final statement to the Swedish Government in early 2016. [3]

2.2 Finland

Fortum Oyj and Teollisuuden Voima Oyj, the two companies that own the existing nuclear power plants in Loviisa and Olkiluoto, respectively, formed in 1996 a joint company, Posiva Oy, to deal with their nuclear waste. [4] The SNF from the NPPs is stored at the power plant sites until it will be disposed of. Initially, the SNF is cooled for one to five years in the storage pools inside the reactor buildings. The Loviisa NPP has, in addition to the storage pools in the reactor buildings, a separate integrated pool type storage facility. When the encapsulation facility and final disposal repository is

completed, it plans to dispose of the SNF at final disposal repository in 2020.

The licensing process is defined in the Finland legislation. The construction and operation licenses are prepared by the Ministry of Employment and the Economy (MEE) and granted by the Government. For a NPPs, a SNF storage, a nuclear waste disposal facility or another significant nuclear facility the process consists of three steps: Decision-in-Principle (DiP), Construction License, Operation License. According to the Nuclear Energy Act, the operation licenses of a nuclear facility are granted for a limited period of time, generally for 10–20 years. In case the operating license is granted for a longer period than 10 years, a periodic safety review is required to be presented to STUK, the Radiation and Nuclear Authority. The periodic re-licensing or review has allowed good opportunities for a comprehensive safety review. Before a Construction License for a NPP, SNF storage, nuclear waste disposal facility or other significant nuclear facility can be applied for, a DiP by the Government and a subsequent ratification of the DiP by the Parliament are required. An Environmental Impact Assessment (EIA) procedure has to be conducted prior to the application of the DiP and the EIA report has to be annexed to the DiP application. A condition for granting the DiP is that the construction of the facility in question is in line with the overall good of the society. [5]

Finland Government made a policy decision in 2000, which was ratified by the Parliament in 2001, to proceed with a disposal project for SNF in Olkiluoto in the Municipality of Eurajoki and to construct an URL, ONKALO, at the site. The site is close to a nuclear power plant, and the decision was supported by the Municipality of Eurajoki and by STUK. [6] The construction of the site at Olkiluoto began in 2004; the operating company Posiva is aiming to start the disposal of SNF in 2020.

2.3 Problem of the licensing process in Korea

In licensing processes for SNF disposal repository, Siting disposal repository in a nation is one of the most sensitive issues. To not repeat the mistake of experience from LILW disposal repository, through the licensing processes for successful the SNF disposal facility siting plan of Sweden and Finland, the Korean government need to find the problem of licensing process for siting LILW disposal repository of those days. Knowing the problem of siting LILW disposal repository and complements the process, will achieve better results on siting of SNF disposal repository. This paper points out four problems.

First, the siting process was carried out hastily. Siting process of Sweden, Finland, and South Korea respectively in 1977, 1978, and 1986 began. From site selection to the first release candidate, Sweden and Finland were carried out for about 30 years and 20 years

respectively. During the siting period, Sweden has regularly published the results of research and Finland has annually reported the siting process and was held into the EIA presentation. These aggressive information publication has enhanced the residents' confidence for SNF disposal facility Whereas Korea has selected the candidates a total of four in less than three years after starting the siting process. All of the four candidate sites have been foundered as opposed to residents. Siting process of the government performed during a short time were insufficient to get the residents confidence.

Second, the roles of the regulation authority were not present. Sweden and Finland was established regulation authority almost simultaneous with operated first nuclear reactor (research reactor). Two countries' SNF disposal repository processes both required evaluation of regulation authority, continuously communicate with SNF Disposal Company until final evaluation is determined. In the case of South Korea, no role of regulation authority on siting process of LILW disposal repository in 2007. The Nuclear Safety and Security Commission (NSSC) as regulation authority was established in 2011, and is planned to establish the Public corporation for SNF management in 2016. The regulation authority for SNF management must be independent and its role should be clear.

Third, the rights of municipality are not guaranteed. Sweden and Finland have been denied rights guaranteed in municipalities and determine the compensation through direct consultation with SNF Disposal Company. On contrary, the repeated failures of the Korean Government's siting policy are due to the fact that it relied on the DAD (Decide-Announce-Defend) siting policy emphasizing the technical and economic criteria while neglecting the demands from the local communities to participate in the decision making process. [7]

Finally, the residents do not trust nuclear-related facilities. SNF Disposal repository site of Finland and Sweden is located in areas where an already nuclear facility was located. In addition, LILW repository is also located in the area of nuclear facilities were already located. Korea also LILW repository is also located in the gyeongju of nuclear facilities were already located, but other nuclear facilities (especially SNF facilities) are specified in the law it cannot be built. Eventually, the siting of new nuclear facilities will be influenced by the confidence of residents for the existing nuclear facilities.

3. Conclusions

This paper is focused on the licensing process of SNF disposal repository. The problem of licensing process relating to nuclear facility in Korea was investigated based on licensing processes of Sweden and Finland and discussed improvements. Even if the licensing process of Sweden and Finland has been successfully applied to

each country, Korea may not be suitable. However, the systematic licensing process in Sweden and Finland could be a good example that can be given a solution to the licensing process problems in Korea. If appropriately complements licensing process in Korea from two cases, it will be able to achieve better results in the siting process of SNF disposal repository.

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