Establishment of Master Plans on Spent Nuclear Fuel in Korea – 17097

Sungil Kim *, Hojin Lee *, Sangmyeon Ahn *
* Korea Institute of Nuclear Safety
(sikim@kins.re.kr)

ABSTRACT

This study pertains to the Master Plans for High-Level Radioactive Waste Management prepared by the Korean Government on the basis of the predicted amount of spent nuclear fuel in Korea and the results of public discussion of the issue. The Korean Government has established the Master Plans for High-Level Radioactive Waste Management on the basis of the results of public discussion of the issue to secure the safety of the nationals and resolve the policy uncertainty that has been accumulated for more than 30 years. To provide a legal basis for the implementation of the Master Plans, legislation of the Act on High-Level Radioactive Waste Management Procedures (tentative) will be promoted, and an independent implementation institute, (tentatively named as) the Management Facility Strategy Committee, and an administrative supporting organization, the Planning and Promotion Group, will be organized and operated. This study is expected to transfer experience of and lessons from determining national policy to countries that have not established their final management policy for spent fuel, based on the formation of national consensus.

INTRODUCTION

The 23 nuclear reactors in Korea produce an annual 750 tons of spent nuclear fuel, and 13,806 tons are being stored in the temporary storage facilities of each reactor. This averages to 72% of the storage capacity as of late 2014. These temporary storage facilities, beginning with Kori Nuclear Power Plant, are expected to reach saturation beginning in 2016. Even if high-density storage racks are replaced and storage capacity is expanded by transferring spent nuclear fuel to new reactors, storage will saturate beginning with the Hanbit Nuclear Power Plant in 2024.

The Nuclear Energy Promotion Commission decided on the "Execution Plan for Spent Fuel Management Plan" in the 2nd meeting held on November 20, 2012 and setting a direction for developing a spent fuel management plan as follows: (1) put safety first (2) develop short-, mid- and long-term management plans (3) prepare supporting measures which can be accepted by the general public to ease the burden borne by future generations and local residents. At the same time, it was decided to form and run a public engagement commission so as to develop a management plan while securing the highest possible level of acceptance.

On October 30, 2013, the Public Engagement Commission on Spent Nuclear Fuel Management was lunched and embarked on public engagement activities with an

aim of presenting recommendations on the method for managing spent fuel to the government by June 2015. Therefore, a national policy, strategy and management plan for spent fuel will be presented in detail in the Basic Plan for Radioactive Waste Management where the results of above-mentioned public engagement activities will be incorporated.

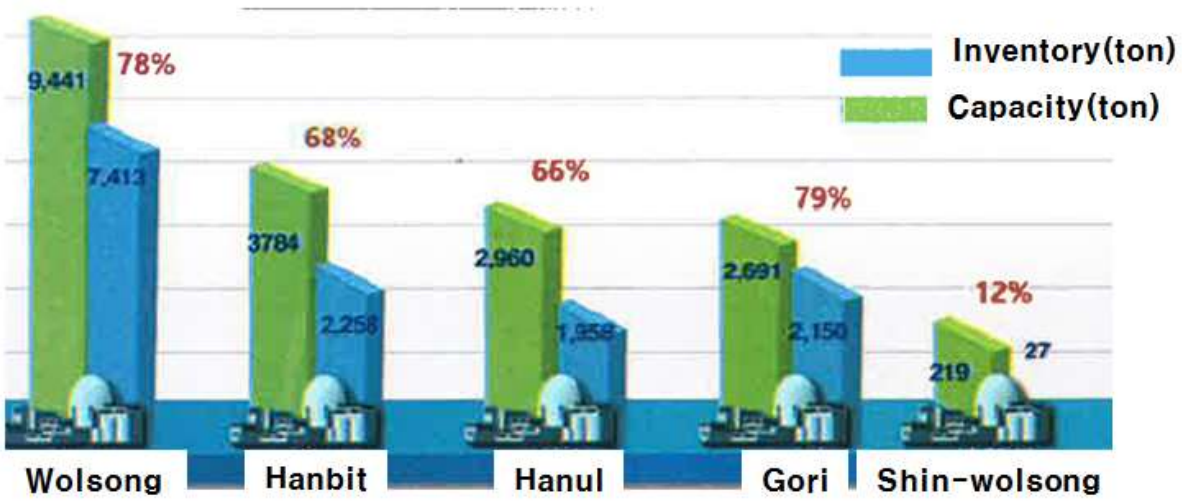

FIG. 1.Status of Spent Nuclear Fuel Generation in Korea NPP

Spent fuels generated in the PWR plants are stored in a spent fuel pool for each unit. To date, almost all PWR plants continue to implement measures to address the lack of storage capacity such as installing storage racks additionally, installing high-density storage racks or transferring spent fuels to the spent fuel pool of other neighboring units. Spent fuels generated in PHWRs which are Wolsong Units are stored in spent fuel pools for longer than six years and then transferred to the dry storage facility on site.

Effort to solve the shortage of storage capacity

Spent fuels generated in the PWR plants are stored in a spent fuel pool for each unit. To date, almost all PWR plants continue to implement measures to address the lack of storage capacity such as installing storage racks additionally, installing high-density storage racks or transferring spent fuels to the spent fuel pool of other neighboring units. Spent fuels generated in PHWRs which are Wolsong Units are stored in spent fuel pools for longer than six years and then transferred to the dry storage facility on site.

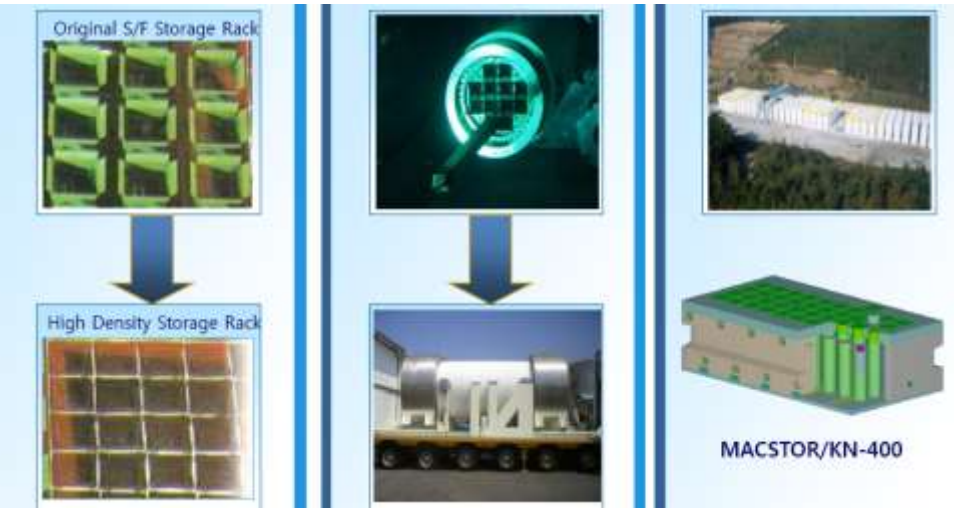

FIG. 2. Effort to solve the shortage of storage capacity

RECOMMENDATIONS FROM PUBLIC ENGAGEMENT COMMISSION

Public Engagement Commission (PEC) finally recommended public-consulted management options for Spent Nuclear Fuel, as a candidate national policy to the Government, Ministry of Trade, Industry and Energy (MOTIE) in June 2015.
Final 10 recommendations were made for National Policy and implementation of Spent Nuclear Fuel (SNF), some key milestone and recommendations are as follows:

1. Top priority principles of SNF management policy is public safety. We need to manage SNF effectively and safely under the governmental responsibility.
It is intended that the selected management technology has been proven from the relevant experts. The results of technology application should not put undue burden on future generations.

2. A stable storage facility should be provided before beyond the current temporary storage capacity or before the operation permission period expires.

3. Permanent disposal facilities should be constructed and operated with the goal of 2051. For this reason, Underground research laboratory (URL) in the same area and on-site and site conditions of disposal facilities by selecting the site and construction process in 2020 should be started and the empirical study should be initiated in 2030.

4. The "Environmental Monitoring Center (tentative name)" that can be joined by local residents should be established at a disposal facility and the underground

laboratory (URL) area. Paying the cost to the region is recommended to construct a stable economic base and raise the quality of life.

5. Even if before the disposal facility is operated, pre-disposal storage facility should be constructed on the URL site. If unavoidable, a short-term storage facilities should be established in each nuclear power plant. Making an efforts is needed such as international cooperation to achieve the international standards.

6. If a short-term storage facility will be established at the nuclear power plant, operator should pay a "storage cost of spent nuclear fuel".

7. It is needed to be performed by developing a detailed plan for the step-by-step and to set up the prioritize development about storage, transportation, disposal and techniques to reduce the toxicity and volume of SNF. To do so, it is the urgent needed more than anything is that it presents the regulatory standards.

8. It is recommended the establishment of "spent nuclear fuel technology and Management Corporation (tentative name)" to have the responsible for development of spent nuclear fuel related technologies and stage management.

9. In order to ensure the reliability, immediately a "special law of spent nuclear fuel (tentative name)" should be established and, if necessary, amended the existing laws and regulations.

10. To establish a management policy of fuel as soon, "spent nuclear fuel relationship Commissioners (tentative name)" and "Management measures promoting team of spent nuclear fuel (tentative name)" should be established in the governmental organization.

ESTABLISHED MASTER PLANS FOR HLW MANAGEMENT

The Korean Government has established the Master Plans for High-Level Radioactive Waste Management on the basis of the results of public discussion of the issue to secure the safety of the nationals and resolve the policy uncertainty that has been accumulated for more than 30 years. According to Article 6 of the Radioactive Waste Management Act (Master Plans for Radioactive Waste Management), the plans were established by the Minister of Trade, Industry and Energy and underwent deliberation and resolution by the Nuclear Energy Promotion Commission.

Three key projects were established by the Master Plans: 1) An underground research laboratory (URL) for licensing, an intermediate storage facility, and a permanent disposal facility shall be progressively prepared at a single site; 2)

Efforts shall be made to secure international collaborative storage and disposal facilities on the basis of international cooperation; and 3) Efforts shall be made to promote the understanding of the public and to secure essential management technologies so that the general public may have confidence in the safety. Specifically, it is expected that about 12 years will be required to determine the site in a scientific and democratic manner (① Exclusion of inadequate regions → ② Public offering for a site → ③ Fundamental site investigation → ④ Verification of residents' willingness → ⑤ In-depth site investigation). After securing a site, the construction of an intermediate storage facility (requiring about 7 years) and the construction and empirical study of a URL for licensing (requiring about 14 years) will be implemented simultaneously. After the empirical study of the URL for licensing, a permanent disposal facility will be constructed (requiring about 10 years).

Until the time when a spent nuclear fuel management facility is secured outside nuclear power plants, dry storage facilities inevitably should be prepared at the sites of nuclear power plants to manage spent nuclear fuel. A reasonable level of support should be made for the regions where the nuclear power plants are located. To provide a legal basis for the implementation of the Master Plans, legislation of the Act on High-Level Radioactive Waste Management Procedures (tentative) will be promoted, and an independent implementation institute, (tentatively named as) the Management Facility Strategy Committee, and an administrative supporting organization, (tentatively named as) the Planning and Promotion Group, will be organized and operated.

CONCLUSION

Spent fuels generated in the PWR plants are stored in a spent fuel pool for each unit. To date, almost all PWR plants continue to implement measures to address the lack of storage capacity such as installing storage racks additionally, installing high-density storage racks or transferring spent fuels to the spent fuel pool of other neighboring units. Spent fuels generated in PHWRs which are Wolsong Units are stored in spent fuel pools for longer than six years and then transferred to the dry storage facility on site. Through the Public Engagement Commission, Korea plans to derive recommendations for the management of spent nuclear fuel based on public feedback, and to subsequently establish management policies. The Korean Government has established the Master Plans for High-Level Radioactive Waste Management on the basis of the results of public discussion of the issue to secure the safety of the nationals and resolve the policy uncertainty that has been accumulated for more than 30 years.

This study is expected to transfer experience of and lessons from determining national policy to countries that have not established their final management policy for spent fuel, based on the formation of national consensus.

REFERENCES

[1] Korean fifth National Report under the Joint Convention, 2014
[2] Korea Radioactive waste Society Seminar, public engagement support group 2015

ACKNOWLEDGEMENT

This work was supported by the Nuclear Safety Research Program through the Korea Foundation of Nuclear Safety (KoFONS), granted financial resource from the Nuclear Safety and Security Commission (NSSC), Republic of Korea (No. 1305004).