

Development of the Licensing Procedure and Regulatory Framework for the Spent Fuel Storage facility in Korea - 16423

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ABSTRACT

The Public Engagement Commission on SNF management (PECOS) published the recommendation report on the spent fuel management of Korea in June, 2015. Based on this report, the future national policy for spent fuel management of Korea has been established, taking into consideration the national/international trends on policy and technology development.

Regardless of the recommendation report of PECOS, Spent fuel storage casks are necessary in Korea. Therefore, various types of spent fuel storage casks are now being developed by Korea vendors. For example, Concrete storage casks and dual purpose metal casks are now under development by the KORAD (Korea RADioactive waste agency) for future use in the interim storage facility.

Unfortunately, there is no independent licensing procedure for spent fuel storage casks in Nuclear Safety Act (NSA) because the casks are considered an integral part of the interim storage facility safety equipment. Furthermore, the definition of radioactive waste in the NSA was changed recently. Now, spent fuel is separated from the definition of 'radioactive waste'. Spent fuel can only become radioactive waste by the decision through the meeting of the relative ministers of Korea government. For that reason, the licensing procedure for interim spent fuel storage facilities was separated from the current 'disposal facility, etc.' in accordance with the article 63 of NSA. The aim of this study is to develop the licensing procedure for the storage cask, and also to develop a revised draft of interim storage facility procedure within the NSA. Once this independent licensing procedure on the spent fuel storage cask is introduced to the NSA, it is expected that developers or operators can develop and commercialize the storage cask in Korea.

In this study, an independent licensing procedure for the spent fuel storage facility was developed including the storage cask licensing procedure for the NSA. The procedure was composed of the permit for construction and operation of interim storage facility, criteria for permit, inspection criteria, periodic safety review, and decommissioning criteria, etc. The detailed contents of these requirements were also developed to introduce the regulatory framework for the interim storage facility. Particularly, periodic safety review and decommissioning criteria were developed in accordance with the recommendation of IRRS (International Regulatory Review Service) of IAEA.

The developed licensing procedure for spent fuel storage facility will be introduced in NSA in response to the revised definition of NSA and the recommendation report of PECOS.

INTRODUCTION

As the inventory of spent fuel increases at NPPs in Korea, KHNP(Korea Hydro Nuclear Power), the operator of NPPs, needs to increase capacity of spent fuel interim storage facilities. For that reason, the Public Engagement Commission on Spent Nuclear Fuel Management was launched and embarked on public engagement activities with an aim of presenting recommendations to the government on the method for managing spent fuel by June, 2015. 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 [1]. Regardless of the recommendation report of PECOS, spent fuel storage cask is necessary in Korea. Therefore, concrete storage cask and dual purpose metal cask are now under development by the KORAD (KORea RADioactive waste agency) for future use in the interim storage facility. There is no licensing procedure for storage casks in Korea, in contrast to general license procedures for spent fuel storage casks in the U.S.A. In this study, the development of the licensing procedure of spent fuel storage casks was performed along with the improvement of the regulatory framework for the interim spent fuel storage facility.

DRAFT OF THE REVISION FOR LEGISLATIVE FRAMEWORK OF NUCLEAR REGULATION

Revision of definition of spent fuel

According to the present NSA, spent fuel is a radioactive waste in accordance with clause 18 article 2 of the act. However, this definition changed July 21, 2015. Spent fuel can be a radioactive waste by the minister of Science, ICT and Future Planning and the minister of Trade, Industry & Energy in consultation with the Nuclear Safety & Security Commission (the Commission) and the relevant ministers and through deliberation and decision of the Nuclear Energy Promotion Commission as prescribed by article 3 of the Nuclear Energy Promotion Act (NPA). This means that spent fuel can be regarded as resource until a decision is made to designate it as radioactive waste by the nuclear energy promotion commission. As the consequence of the change of the definition, the legislative framework of nuclear regulation has to be changed as shown in Fig.1.

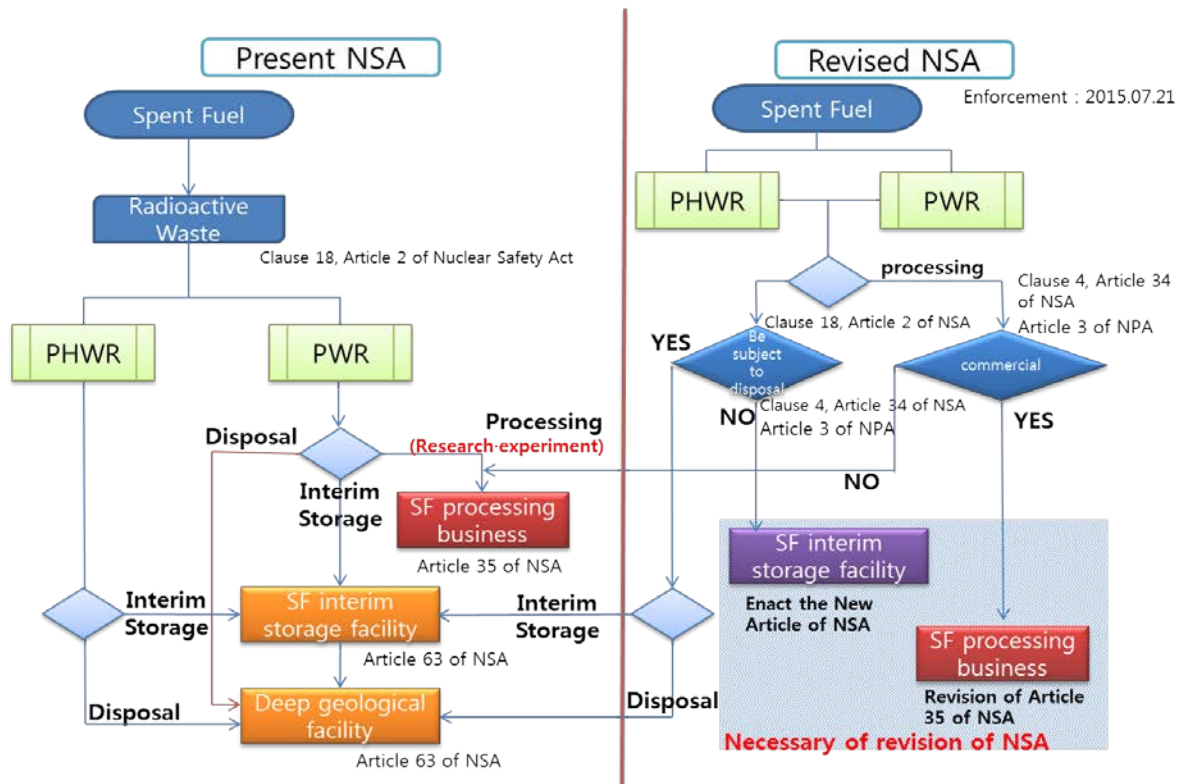


FIG. 1. Legislative framework of nuclear regulation for spent fuel

Article 63 of NSA is principally focused on the permit for construction and operation of disposal facility, etc. Interim storage of spent fuel is a component of the disposal facility in accordance with the present the NSA. However, the interim storage facility will no belong to disposal facility because of the new definition of spent fuel will. For this reason, a new article addressing the spent fuel interim storage facility must be introduced in NSA.

Development of the licensing procedure on the spent fuel storage cask

New articles of NSA for the spent fuel storage facility are necessary to separate interim SNF storage from the SNF disposal facility. Additionally, the licensing procedure on the spent fuel storage cask has to be developed and introduced to the NSA. Until now, there has been no independent licensing procedure for spent fuel storage casks in the NSA in Korea because the storage cask is considered an integral part of the interim storage facility safety equipment. The main features of newly developed licensing procedure of storage cask is to introduce the design approval of storage cask, administrative application procedure, technical criteria, manufacturing inspection, manufacturing inspection criteria, periodical inspection, and periodic inspection criteria, etc.

Design approval of storage cask

Figure 2 shows the legal framework for nuclear safety regulation of Korea. In order

to introduce the design approval of storage casks into the licensing procedure and legislative framework, related articles have to be developed and introduced in the act, enforcement decree and enforcement regulations.

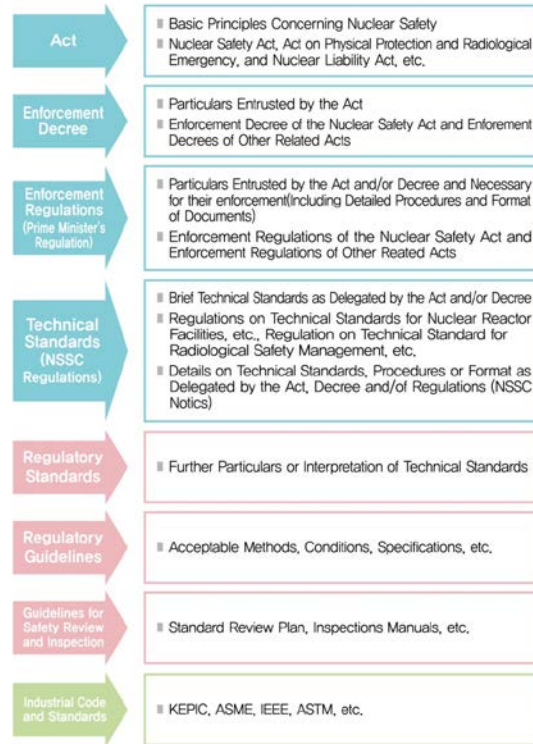


FIG. 2. Legal Framework for nuclear safety regulation [1]

The design criteria and design approval process for storage casks will be introduced in the NSA. Those who intend to manufacture the spent fuel storage cask shall obtain approval from the Commission in accordance with design criteria as follows:

1. The design, materials, structure and performance of storage casks shall confirm to the technical standards as prescribed by the Regulation of the Commission
2. Storage cask shall conform to the standards as prescribed by the Regulation of the Commission in order to prevent any harm to public health and the environment caused by the radioactive materials due to the damage and abrasion
3. The contents of quality assurance program for the design and manufacture shall confirm to the standards as prescribed by the regulation of the Commission

The detailed technical standards of the Regulation of the Commission will be developed and introduced in the future.

Licensing procedure for the storage casks

The licensing procedure on the storage casks within the regulatory framework is shown in figure 3;

	Nuclear Safety Act	Enforcement Decree	Enforcement Regulations
Design	Design Approval Design criteria	Applying for Design approval	The application process for Design approval
Manufacture	Manufacture inspection	Applying for Manufacture inspection Passing criteria of Manufacture inspection	The application process for manufacture approval
Operation	Inspection	Periodic inspection Passing criteria of Periodic inspection	The application process for periodic inspection

FIG. 3. Licensing procedure for storage casks in each step of design, manufacture and operation

Passing criteria for manufacture inspection shall be as follows;

1. Consistency with the details of the design, materials and structure that received design approval
2. Conformity to the standards as determined and publicly issued by the Nuclear Safety and Security Commission with respect to the items, methods and so forth of inspection by type of storage cask.

Passing criteria for periodic inspection shall be as follows;

1. Maintenance of performance at the time of passing the inspection of manufacture; and
2. Conformity to the standards as determined and publicly issued by the Nuclear Safety and Security Commission with respect to the items, methods and so forth of inspection by type of storage cask

The detailed technical standards will be developed and publicly issued by the Commission under the title of regulations for manufacture and periodic inspections of storage casks by the end of 2017.

Safety case and aging management

According to the IAEA definition [2], the safety case is a collection of arguments and evidence in support of the safety of a facility or activity. The safety case will normally include the findings of a safety assessment, and will typically include

information (including supporting evidence and reasoning) on the robustness and reliability of the safety assessment and the assumptions made therein. In order to introduce this concept within the regulatory framework, the preliminary study on the safety case at Wolsong nuclear power plant was performed [3]. A consensus among regulator, utility, designer/manufacturers on the introduction of safety case is needed. A regulatory position for periodic safety review of the spent fuel casks, whether single or dual purposes, is now under development in order to introduce the safety case into the regulatory framework of the NSA. Aging assessment management is one of the items requiring periodic safety review. Therefore, contents of the aging management program will also be developed. The aging management program has to be submitted to the regulatory body when the applicant submits their license application for the interim storage facility or design approval of storage casks. Aging management programs have to be composed of prevention, mitigation, monitoring, inspection, and maintenance programs [3].

Development of the licensing procedure on the spent fuel interim storage facility

The licensing procedure of interim spent fuel storage facility has to be separated from the current 'disposal facility, etc.' in accordance with the article 63 of NSA due to the revision of the definition of radioactive waste. This procedure is composed of the permit for construction and operation of interim storage facility, criteria for permit, inspection criteria, periodic safety review, and decommissioning criteria, as well as other elements. The detailed contents of these requirements are also being developed to introduce the regulatory framework for the interim storage facility. Figure 4 shows the main regulatory framework of the spent fuel interim storage facility including the licensing procedures for storage cask. The NSA prescribes basic matters on safety to be applied to a spent fuel interim storage facility. The enforcement decree of the NSA specifies the detailed requirements necessary for implementing basic matters, and the enforcement of regulation of the NSA specifies the detailed procedures and describes license application document.

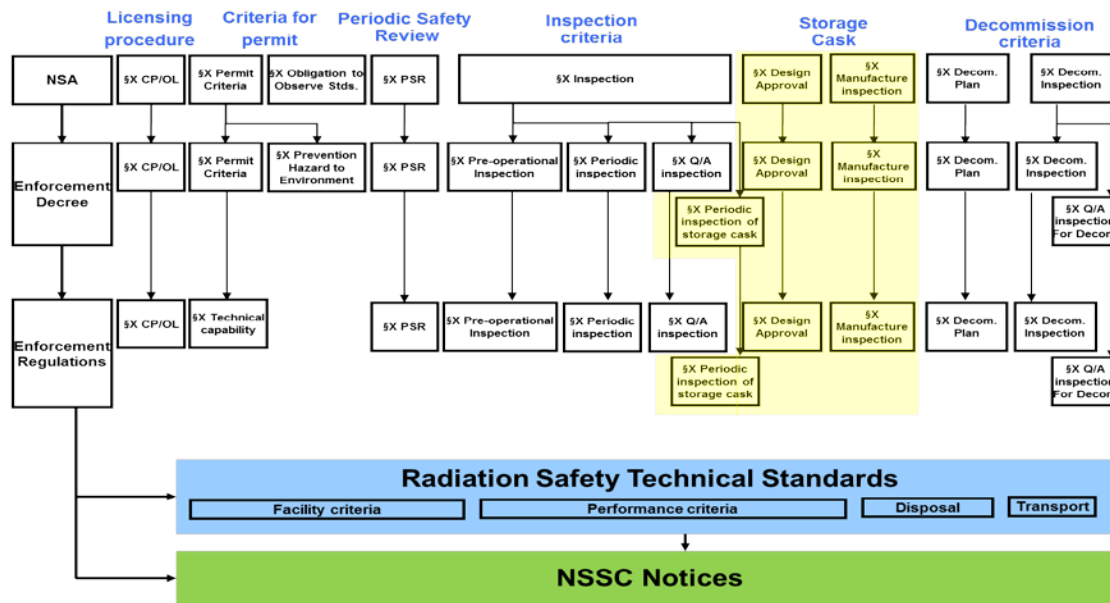


FIG. 4. The main regulatory framework on the spent fuel interim storage facility

RESULTS AND CONCLUSION

In this study, the development plans for a licensing procedure and regulatory framework for spent fuel interim storage facilities were described. Spent fuel storage is no longer included within ‘disposal facility, etc’ in accordance with the article 63 of NSA. In order to develop the regulatory framework for this separate facility, licensing procedures for SNF storage casks are also under development, and will support efforts by several private companies including KORAD in developing storage casks. Licensing procedures for storage casks is composed of the design approval, manufacture inspection and periodic inspection. The development of a safety case and aging management program within the regulatory framework is needed previous study. Further study and development is needed. The regulatory requirement of the safety case and aging management will be also developed when the detailed technical standards of the interim storage facility through the development of the NSSC notices are provided. The results of this study will be used to develop the revision of NSA, enforcement decree and enforcement regulation.

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ACKNOWLEDGEMENTS

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