

# Study on Improvement of Licensing Requirements of Fuel Cycle Facilities

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## 1. Introduction

As the cumulative amount of spent fuel generated from 24 nuclear reactors operating in Korea is expected to become gradually saturated in near future, Public Engagement Commission on Spent Nuclear Fuel Management, through the final report published in 2015, recommended that the spent fuel stored in NPPs be transferred to an interim storage facility before the on-site storage capacity is exceeded and that a waste disposal facility be constructed and operated.

While there is an aspect of difficulty in securing the budget and the site when directly disposing of the spent fuel generated from the light water reactor, there are also discussions on how to use the spent fuel as a useful resource by recycling it, as an alternative to the direct disposal of spent fuel. For this purpose, pyro-processing, one of the dry processing methods of spent nuclear fuel, has been studied for years by Korea Atomic Energy Research Institute (KAERI). However, there is no experience of safety review to license the spent fuel recycling facility in Korea yet and its safety evaluation methods have not yet been established. Therefore, it would be necessary to review and prepare a licensing system for spent fuel processing facilities in the current Nuclear Safety Act in Korea.

In 2014, IAEA Integrated Regulatory Review Service (IRRS) of the nuclear fuel cycle facilities in Korea demanded that legal bases for the periodic safety review (PSR) and for the safety assessment report by an integrated safety assessment (ISA), including chemical and radiological hazards, should be provided to improve the safety regulatory framework of nuclear fuel cycle facilities.

This study will review on the licensing system in Nuclear Safety Act for the fuel cycle facilities and discuss what needs to be improved in the future.

## 2. Legal basis for fuel cycle facilities

In order to carry forward a project of spent fuel recycling facilities in the future, the legal basis for this sort of facility should be specified in Nuclear Safety Law beforehand. So, it would be necessary to first consider whether legal terms are well defined in nuclear safety act and regulations. The legal basis for fuel cycle facilities in Nuclear Safety Act were reviewed whether the pyro-processing facility can be classified as a spent fuel processing facility and whether transuranic fuel manufacturing facility, which handles transuranic elements extracted from pyro-processing, can be classified as a manufacturing facility.

In addition, the relevance of licensing procedure for the spent fuel processing facility was examined through the review of the Article 35 in the Nuclear Safety Act. In fact, the revised bill on the second clause of the article that applicants for the spent fuel processing facility are required to be designated by the competent Minister according to the enforcement decree, has already been laid before the National Assembly in 2016. This clause was modified to strengthen the safety on the spent fuel processing facility by Nuclear Safety and Security Commission as well as to separate the utilization of nuclear power and its regulations.

## 3. Documents to be submitted for license application related to fuel cycle facilities

The documents to be submitted for license application such as refining, processing and conversion facilities of nuclear fuel materials or nuclear raw materials shall be prepared in accordance with the third clause of Article 35 of the Nuclear Safety Act. The documents involve reports on radiological environmental impact assessment, safety

management regulations, quality assurance plan, decommissioning plan and other documents prescribed by the enforcement regulations. When compared to the cases of power reactors and radioactive waste management facilities, the most significant difference in license application of the spent fuel recycling facilities is that documents to be submitted as a license application do not currently require a safety analysis report and that the documents required by the enforcement regulations of the Nuclear Safety Act are more complex than the other two cases.

Documents required by the second clause of Article 31, Article 40 and Article 44 of the enforcement regulations for the license of spent fuel related facilities, already include site characteristics, design, radiation protection and accident analysis, which are described in the safety analysis report of the other facilities. However, it would be desirable to submit a safety analysis report to simplify the document submission for authorization and of increasing efficiency for safety evaluation. It would be desirable that facility location and structure, radiation exposure management, radioactive waste management, design and construction manuals, etc. be all integrated into the safety analysis report in order to simplify the document submission.

#### **4. Licensing step for fuel cycle facilities**

Another aspect of discussion involves licensing step. Licensing the power reactor requires usually two steps, i.e. a construction permit followed by an operating license. Radiological risk for the materials handled by spent fuel recycling facilities are relatively high compared to other nuclear fuel cycle facilities, such as low enrichment uranium fuel fabrication facility, currently in operation. Actually, one-step licensing may not be appropriate to a technology where there has been essentially no experience and when it isn't even known how to assess the risk of this technology yet. No data other than laboratory data is available with almost no idea of operational problems and frequencies of failure. Therefore, one-step licensing system could be a burden not only to both the regulatory bodies and the utilities but also to the acquirement of public acceptance.

On the other hand, two-step licensing system similar to the case of power reactor, would have

demerits that it require more cost and time to be consumed for the legal improvements. In addition, prolonged time for licenses can result in the delay of project launching. IAEA safety document requires that every project for a new fuel cycle facility shall follow an authorization process that comprehensively addresses all safety aspects, so that two-step licensing process would be desirable to cover sufficiently safety features of facilities with relatively high risk of radiological hazard. Further discussion would be required on formulating the rulemaking to allow either one-step or two-step licensing.

#### **5. Conclusion**

The review on the licensing system of the spent fuel recycling facilities in Nuclear Safety Act was carried out in comparison with those of other nuclear facilities, referring to IAEA Safety Standards and US regulatory documents. Some improvements on legal basis, license application documents to be submitted and licensing steps were proposed for the licensing system of the nuclear fuel cycle facilities in Nuclear Safety Act. It is expected that proposed improvements will be effectively utilized to revise the licensing system of the fuel cycle facilities in the future.

#### **REFERENCES**

- [1] IAEA Safety Standards, "Safety of Nuclear Fuel Cycle Facilities", No. NS-R-5 (rev. 1), 2014.
- [2] U.S.NRC, "Draft Regulatory Basis for Licensing and Regulating Reprocessing Facilities", SECY-11-0163, 2011.