

## Comparison of the PSR and the License Renewal

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### 1. Introduction

The design lifetime of Kori #1 plant is 30 years based on the FSAR. This means it is high time to discuss the continuous operation of Kori #1. Korea Hydro & Nuclear Power Co. (KHNP) has undertaken Periodic Safety Reviews (PSR) of its operating nuclear power plants. USNRC has established license renewal process and requirements codified in 10 CFR 51 and 10 CFR 54. Here, the experiences of PSR are compared with the US license renewal rule in order to examine whether the results of PSR can be used for the decision of continued operation.

### 2. Comparison of the PSR and the LR Rule

In this section overview of PSR and LR rules is described. This includes the comparison results of PSR and LR rule.

#### 2.1 PSR Overview

The objective of a PSR is to determine by means of a comprehensive safety assessment of an existing nuclear power plant, to what extent the plant meets current internationally accepted safety standards and practices to what extent the licensing basis remains valid, whether adequate arrangements are in place to maintain plant safety until the next PSR or end of service; and to recommend how to resolve issues that have been identified[1]. KHNP has executed PSRs of its 5 nuclear power plants and 4 plants are on going.

#### 2.2 LR Overview

The LR rule contains the regulatory requirements that must be satisfied in order to obtain a renewed license, which allows continued operation of a nuclear power plant over the plant's lifetime. The LR rule is to provide reasonable assurance that the effects of aging on the functionality of long-lived passive structures and components are adequately managed in accordance with the plant-specific CLB design basis conditions such that the intended functions are maintained in the period of extended operation. The LR application contains general information, technical information, information regarding technical specifications, and environmental information. The technical information includes the Integrated Plant Assessment (IPA), the listing and evaluation of the Time-Limited Aging Analysis (TLAAs), and the supplement to the plant's FSAR which contains a summary description of the programs and activities that are cited as managing the effects of

aging and the evaluation of time-limited aging analyses [2].

#### 2.3 Integrated Plant Assessment

The applicant for license renewal should describe and justify methods used to identify systems, structures, and components (SSCs) subject to an aging management review (AMR)[10 CFR 54.21(a)(2)]. The SSCs subject to AMR are those that perform an intended functions and meet the two criteria : (1) they perform such functions without moving parts or without a change in configuration or properties [10 CFR 54.21(a)(1)(i)], and (2) they are not subject to replacement based on a qualified life or specified time period (denoted as "long-lived" structures and components) [10 CFR 54.21(a)(1)(ii)].

Methods of identification of SSCs and aging assessments for a PSR are mainly based on Reg. Guide 1.89, IEEE 323-1974, and 10 CFR 50.49. This fulfills the requirements of LR IPA. Effects of aging will be adequately managed so that the intended function will be maintained consistent with the current license basis.

#### 2.4 Time-Limited Aging Analysis

The list of TLAAs is certain plant-specific safety analyses that are based on an explicitly assumed 40-year plant life. Pursuant to 10 CFR 54.21(c)(1), a license renewal applicant is required to provide a list of TLAAs, as defined in 10 CFR 54.3. TLAAs are those licensee calculations and analyses that (1) involve SSCs within the scope of license renewal [10 CFR 54.4(a)]; (2) consider the effects of aging; (3) involve time-limited assumptions defined by the current operating term; (4) were determined to be relevant by the licensee in making a safety determination; (5) involve conclusions or provide the basis for conclusions related to the capability of SSC to perform its intended function(s) [10 CFR 54.4(b)]; and (6) are contained or incorporated by reference in the CLB.

In the PSR, evaluations for actual condition of SSCs, equipment qualification, and aging are performed. The objective of the review is to determine the actual condition of SSCs important to safety and whether it is adequate to meet its design requirements. Having determined the current condition of the SSCs important to safety, each SSC should then be compared with its design basis to confirm that aging has not significantly undermined the design basis assumptions. And then, the equipment important to safety should be properly qualified to ensure its capability to perform its safety functions under postulated service conditions. A qualification procedure should confirm that the

equipment is capable of meeting, throughout its service life, the requirements for performing safety functions while subject to the environmental conditions existing at the time of need, and taking into account aging degradation of the equipment that occurs during service. After that, aging review is performed to determine whether aging is being effectively managed and whether an effective aging management program is in place for future plant operation. While the safety factor "actual condition of SSCs" establishes the condition of the SSCs at the time of the PSR, the safety factor "aging" is primarily concerned with the condition of the SSCs in the future. Through the aging review, the requirement of TLAA is fulfilled.

### 2.5 Environmental Information

The LR rule requires that each application must include a supplement to the environmental report that complies with the requirements of Subpart A of 10 CFR Part 51. 10 CFR Part 51 amended in 1996 and 1999 to codify the results of a Generic Environmental Impact Statement (GEIS) which resolved 69 of the 92 environmental impacts identified for license renewal. Remaining impacts are addressed in a plant-specific supplemental environmental impact statement[3].

The purpose of this requirement is to give information the decisionmakers to determine whether the adverse environmental impacts of LR are so great that preserving the option of LR for energy planning

would be unreasonable. But, the scope of the environmental information for LR is more limited than the scope of the environmental evaluation for an initial license application [4]. PSR evaluation report can be comparable to the required environmental information of LR.

### 3. Discussions and Conclusion

License renewal rests on the determination whether currently operating plants continue to maintain adequate level of safety over the plant's lifetime by IPA and TLAA. PSR can give as good information as required by US LR rule. This means that PSR results can be used for license renewal when the regulatory body establishes the requirement or rule. More detailed discussions would be necessary to decide the continuous operation of a nuclear power plant.

### REFERENCES

- [1] 23-3, Atomic Energy Act.
- [2] 10 CFR Part 54, Requirements for renewal of operating licenses for nuclear power plants, USNRC.
- [3] NUREG-1555, Supplement 1, Operating License Renewal, USNRC.
- [4] NUREG-1800, Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants, USNRC.