Proposed Regulatory Guideline on the PSA Quality for Risk-informed Applications

Chang-Ju Lee and Jong Soo Choi

Korea Institute of Nuclear Safety, 19 Guseong, Yuseong, Daejeon, Korea, 305-338, cjlee@kins.re.kr

1. Introduction

In the policy statement on nuclear safety issued by the Korean government in 1994, the introduction of risk-informed regulations in licensing and regulation of nuclear power plants was emphasized for the first time. It also describes the implementation of comprehensive safety assessment utilizing PSA (probabilistic safety assessment). Since then, because risk-informed environment and fundamentals had not been strong, several R&D on PSA and risk-informed regulation have been done even though their application has been delayed [1]. However, today it is not the case. Since the follow-up policy statement (called Severe Accident Policy) was issued, which prescribes strong items such as PSA implementation and its periodic reassessment, reliability database, and risk monitoring program to the utility, we have a chance to easily get all kinds of risk information for improving current regulatory framework. In addition, with the overall availability of PSA results for all operating nuclear power plants, it is expected that many risk-informed applications (RIAs) will be submitted to the regulatory authority.

In general, there are a lot of regulatory concerns associated with the quality assurance of licensee's submittals for RIA. It is also noted that making general requirements and touching specific check points are essential for the regulatory decision making process. This paper summarizes the structure and contents of our regulatory guideline for assuring PSA quality.

2. Overview of Regulatory Guideline on the PSA Quality

2.1. Purpose of Regulatory Guideline on the PSA Quality

Usually, regulatory decision making in the case of risk-informed applications requires the information enough for ensuring the technical adequacy. This information should be provided with the best available PSA elements including sound work scope covering the objective of RIAs.

The regulatory guideline proposed in this paper has a major objective for reviewing all kinds of information relating with PSA quality and for assuring our decisions. The guideline is also intended to identify and correct the limitation or weak points retained in the RIA submittals.

2.2. Acceptance Criteria on the PSA Quality

In current draft version of the guideline, there are two regulatory criteria for accepting the PSA quality in the licensing submittals of RIA as follows:

(1) The risk information should retain adequate technical adequacy, analysis level, and work scope.

(2) The PSA procedure should be implemented with same level corresponding to the best practices of industries.

For supporting the intent of above criteria we have made prerequisite regulatory requirements as explained in the following sections.

2.3. Requirements for General Consideration

Three general requirements were prepared consulting some foreign practices and guides [2-3]. The key items of the requirements are shown in Figure 1 and as follows:

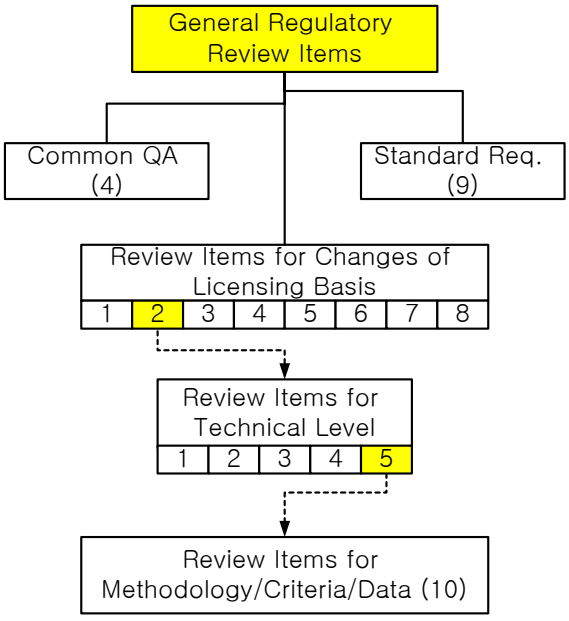

Figure 1. Overall hierarchical structure on general review items in the regulatory guideline proposed. (The number in a box means an article consisted in each section of the guideline.)

(1) Four review categories on quality assurance (QA) are checked commonly with the current QA guidelines.
(2) Nine general requirements for utilizing/making PSA standard are provided.
(3) Eight general review items for the case of changes of licensing basis (submitted by the licensee) are also provided. They have some supplementary review items hierarchically as shown in Figure 1.

The lower level of review items is given for generally taking into account the adequacy on PSA methodology, criteria, and reliability data.

2.4. Requirements for Specific Consideration

Two specific requirements for RIA implementation were also prepared. The first is for the analysis scope, which depends on risk measure, operating conditions, and initiating events, consisting of internal level 1, level 2, internal flooding, internal fire, and hazard analysis.

The next is for mandatory requirements for RIA implementation which have three key articles reflecting realistic features of risk information, as shown in Figure 2. Second article in these requirements is supported by six supplementary elements for each specific analysis scope, including special review item on the documentation.

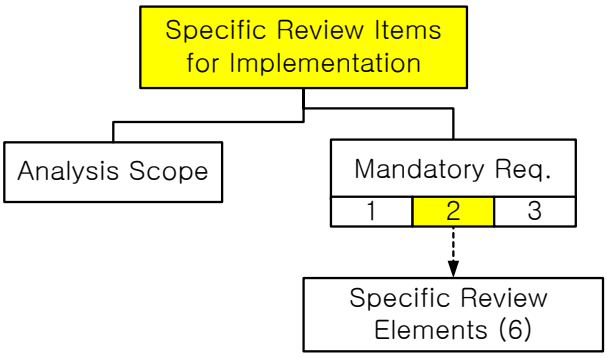

Figure 2. Overall structure on specific review items in the regulatory guideline proposed.

3. Future Plan and Expectation

3.1. Current status and future plan

The guideline has been issued in draft for comments through several domestic PSA experts. The final draft version will be provided reflecting the comments by domestic experts. After that, we will take an essential step for entering our internal process of regulatory guideline certification. During the process we hope to manage lots of useful comments from internal technical staffs including those of PSA area. After getting the certification, the guideline will be implemented in actual regulation.

3.2. Expectation

Within three years, we think that there will be some RIAs by the licensee, i.e. for risk-informed in-service inspection and on-line maintenance, etc [4]. After these actual applications and following regulatory review processes, we hope that the guideline can be practically revised to provide more explicit regulatory requirements.

4. Summary and Conclusions

Through the regulatory research project, the draft guideline on PSA quality for RIA has been prepared and issued for comments. It is expected that this guideline will be one of the fundamentals helping to establish concrete regulatory policy and principles for the embodiment of the risk-informed regulation. It may be also updated reflecting the experiences gained from actual regulatory review processes.

Acknowledgements

This work was supported by nuclear R&D long-term development program of the Ministry of Science and Technology of Korea.

REFERENCES

[1] K. Y. Sung, et al., Current Products and Future Plan of Regulatory Research for Risk-Informed Regulation in Korea, Int. Conference on Nuclear Eng., Tokyo, Japan, April 20-23, 2003.

[2] SECY-00-0162, "Addressing PRA Quality in Risk-Informed Activities," USNRC, July 28, 2000.

[3] SECY-04-0118, "Plan for the Implementation of the Commission's Phased Approach to Probabilistic Risk Assessment Quality," USNRC, July 13, 2004.

[4] W. S. Kim, et al., Study on Institutionalization of Risk-informed and Performance-based Regulation, KINS/GR-282, Feb. 28, 2005.