

Current and Emerging Issues of Risk Assessment & Management Area in Korea

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1. Introduction

Now, 30 years have passed since the PSA began in Korea as a follow-up to the TMI-2 nuclear accident. However, for more than 20 years since the PSA began in Korea, the PSA was not a legal requirement and has been considered voluntary by the operator.

Even in this situation, the Korean nuclear industry has put much effort into PSA. As a result, all domestic nuclear power plants now have individual PSA models, and Korea's PSA technology capabilities have improved greatly.

After the Fukushima nuclear accident in 2011, the PSA became a legal requirement in Korea in 2016, and the role of the PSA has increased.

However, despite such external changes, it is questionable whether the domestic PSA system responds to such external changes properly. Therefore, this paper will look into the current issues facing the domestic PSA world and discuss the solutions.

2. Current and Emerging Issues

The domestic PSA issues are categorized into (1) PSA legal requirements, (2) Fukushima nuclear accidents, and (3) other technical and institutional issues.

2.1 Issues related to PSA legislation

PSA issues related to PSA legislation are largely related to the scope and role of PSA performance. Korea is the first in the world to mandate both 1/2/3 phase PSAs. In fact, domestic PSAs do not have much experience in 2nd stage PSA, and 3rd stage PSA has little experience. In this situation, performing a full scope PSA in steps 1 to 3 can be a challenging task.

In particular, it is very difficult for the 3rd stage PSA to execute the 3rd stage PSA that reflects the domestic environment in the situation where the development of the domestic 3rd stage PSA code is not completed.

Another legal requirement is the derivation of multiple incidents using PSA results. This requirement is a question of whether PSA's role is being implemented properly in PSA's critical role and in actual incident management planning.

In addition, as PSA is included in the evaluation component of the periodic safety assessment (PSR), it is necessary to consider what the role of PSA is in PSR.

With the enactment of the PSA, risk safety objectives have been introduced in Korea. The 0.1% Rule was already a familiar safety goal for us, but the Cs-137 related safety goal is approaching the PSA world as a new challenge.

2.2 Issues related to Fukushima nuclear accident

Although not yet a legal requirement, the PSA is the most important issue addressed to the PSA community in relation to the Fukushima nuclear accident.

As the PSA methodology has not yet been established in the world, various activities are underway in Korea such as regulators, operators and research institutes conducting PSAs and related studies. However, I believe that philosophical considerations about how to use PSA should be preceded in solving the multi-term problem.

Korea also added many new facilities to the nuclear power plant following the Fukushima nuclear accident. However, PSA has not yet demonstrated the effectiveness of these new facilities as PSA results. Finding the improvement and effective operation of these additional facilities through the PSA is one of the important tasks of the domestic PSA system.

Considering these additional facilities, especially in conjunction with multiple PSAs, the problem is further complicated.

2.3 Other Issues

Domestic PSAs have many technical and institutional issues. There are many technical issues such as extreme external events, PSA issues, human reliability evaluation in Digital MCR (Main Control Room) environment, and development of Digital I & C (Instrument & Control) PSA methodology.

I just want to emphasize that we need to put a lot of effort into the fire PSA. Personally, I think that fire accidents are the most important risk factor in domestic nuclear power plants. However, domestic fire PSA levels are still very low to solve this problem. I think it's time for efforts to improve the domestic fire PSA, starting with the question of whether it is the right answer to assess the fire risk as complex as the US fire PSA.

Institutional issues include the introduction of risk information utilization / performance-based regulation

(RIPBR). In Korea, RIPBR is perceived as deregulation of nuclear power plants, and discussions about the introduction of RIPBR in Korea after the Fukushima nuclear accident have been practically suspended.

Of course, regulators and operators are making continuous efforts to introduce some RIPBR systems. However, in view of the US case where RIPBR drastically improved the safety of nuclear power plants, and the efforts of Japan's regulators, the parties to the Fukushima nuclear accident, to reinforce the RIPBR, the debate on how to take the domestic RIPBR system as a whole will be repeated. I think it's time to start.

3. Conclusion

Although I did not include the three PSA issues, I think that the most important issue to be solved by the domestic PSA system is the reliability of the domestic PSA.

Even if the issues discussed above are resolved, domestic PSA development is not easy unless the PSA's reliability problem is solved.

The problem of PSA's credibility is caused by the systemic deficiency, but I think that PSA's lack of effort is large.

Institutionally, I think that Korea's own PSA standard should be established first. It is thought that securing the technical reliability of domestic PSA should be preceded by Korea's own PSA standard, and that the domestic PSA standard should also include the technical conformity of those who participate in PSA.

The following are communication efforts of the PSA world. Recent PSA-related academics suggest that there are only workshops and symposiums on specific technical topics, and efforts to cover the entire PSA and deliver it to non-PSA majors.

In this paper, the author summarizes the current issues facing the domestic PSA world at my personal point of view. Perhaps some of these issues are already under substantial improvement, and some of them are not yet a solution for us. Given that PSA's most important philosophy is synthesis or integration, addressing these issues, including those raised above or not included, and improving the safety of domestic nuclear power plants, It becomes duty.

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