

Summary of the 15th Technical Advisory Committee (TAC) Meeting

- Date:** Nov. 16, 19 and Dec. 9, 2021
- Place:** Nuclear Risk Research Center (NRRC),
Central Research Institute of Electric Power Industry and Webex
- Participants:**
- TAC:** Mr. Stetkar (Chair), Mr. Afzali, Dr. Chokshi, Mr. Miraucourt,
Prof. Takada, Prof. Yamaguchi
- NRRC:** Dr. Apostolakis (Director),
Experts of the Nuclear Risk Research Center
- Observers:** Shikoku Electric Power Company (in the SSHAC meeting)

Proceedings

NRRC Risk Assessment Research Plan and External Natural Event Research Plan for FY 2022 were discussed.

Of the NRRC Research Plan for FY 2022, “NRRC’s activity to promote risk-informed applications” and “The results of the Ikata SSHAC Level 3 Project by Shikoku EPC and the SSHAC-based research of probabilistic seismic hazard analysis (PSHA) activities in Japan” were discussed.

Tuesday, November 16, 2021

Topic 1: Overview of NRRC Risk Assessment Research Plan for FY 2022

- The NRRC presented the overview of the Risk Assessment Research Plan for FY 2022.
- TAC members commented as follows:

Current Status of PRA Method Improvement / Planning R&D

- Shutdown PRA sometimes has as much contribution to the risk as at-power PRA, but the present material may lead to a misunderstanding that shutdown risk is negligible. The material contents should be consistent with the way of prioritizing the research items in NRRC.

Level 1 PRA

- TAC would like the NRRC to share the English report of the internal-event LOOP MUPRA. TAC does not rush NRRC to finalize the report, expecting to receive it after the director’s approval.

Fire PRA

- In the U.S., the issue related to HEAF has a significant regulatory impact. We hope that the HEAF guideline will be developed also in Japan for effective discussion on the subject.

Multi-Unit PRA

- The method for calculating the joint failure probability considering seismic response correlation is an important issue that is also common to single unit seismic PRA.

Risk Communication

- This is a very important program and an objective worthwhile to pursue. We would like to discuss it soon again at the end of the research phase in FY2024.

General comments

- It is a very good idea to have a seminar on HRA. It would be better to share the knowledge with not only the people in NRRC but also those outside including NRA. We recommend that similar lectures be held for other research subjects such as uncertainty.
- Since some new challenging issues have been identified, the NRRC needs to balance the overall research scope and prioritize research problems. It should be time to comprehensively review the research issues in terms of risk significance, level of technical/empirical knowledge, available resources, regulatory necessity, and social interest.
- Since nuclear power is finding its way back as the best value for money in energy generation, focused and resource-intensive research by the NRRC must be useful in the future.

Friday, November 19, 2021

Topic 2: Overview of NRRC External Natural Event Research Plan for FY 2022

- The NRRC presented the overview of the External Natural Event Research Plan for FY 2022.
- TAC members commented as follows:

Current Status of PRA Method Improvement

- In the future, Multi-Hazard PRA for the combined hazards in addition to seismic and seismic-induced tsunamis will have to be developed.

Seismic PRA

- After the fragility evaluation results based on the seismic experience database are summarized, we would like them to be presented in future TAC meetings.

High-Wind PRA

- The current tornado countermeasures have been conservatively and heavily armored. High-Wind PRA should continue to be developed for optimizing countermeasures by analyzing the safety margins as well as the robustness of the countermeasures against tornadoes.

Volcanic ash-fall PRA

- Since the volcanic ashfall can last for days or weeks, the research team needs to demonstrate a comprehensive methodology to quantify the risk of long-term reactor cooling after shutdown due to volcanic ashfall in addition to the usual short-term cooling for both full power and shutdown modes.
- It is better to perform PRA and evaluate risks for not only volcanic ashfall but also other various volcanic impacts.

Friday, November 19, 2021

Topic 3: Overview of NRRC Research Plan on Risk-Informed applications for FY 2022

- The NRRC presented the overview of the Research Plan on Risk-Informed applications for FY 2022.
- TAC members commented as follows:
 - In the US, when practicing the application of 10CFR50.69, the utilities use the guideline developed by EPRI etc. The utilities have an advisory board, which coordinates at the management level to determine what organization of NEI, EPRI, ASME, etc. is to develop the guideline to avoid duplication. This coordination is essential. The NRRC, as a research institute, develops various kinds of guidelines but they seem to be poor in coordination. TAC would like to discuss the role of the NRRC from the perspective of the US utilities.
 - I think that the NRA's involvement is necessary when the NRRC conducts a pilot study. The NRRC should propose a pilot study of a specific application to the utilities and the NRA. However, the situations in Japan and the US can be different. I am not sure the NRA would respond to the NRRC's proposal. I suggest that the NRRC consider well the manner and the system in Japan to realize the pilot study.
 - I understand that the KK7 PRA review was similar to the peer reviews conducted in the US in that international experts check whether the PRA meets the ASME/ANS standards. TAC would like to confirm that this fact has been stated in the report. TAC also would like to discuss this topic in the next TAC meeting.
 - OLM does not necessarily improve safety. Even so, it can be done within the acceptable risk increase.
 - The US utilities claim that OLM improves safety because it reduces human errors by using maintenance personnel with full knowledge of the plants. That is, the risk during refueling outage decreases.

Thursday, December 9, 2021

Topic 4: The results of the Ikata SSHAC Level 3 Project by Shikoku EPC and the SSHAC-based research of probabilistic seismic hazard analysis (PSHA) activities in Japan

- NRRC presented the results of the Ikata SSHAC Level 3 Project by Shikoku EPC and the SSHAC-based research of probabilistic seismic hazard analysis (PSHA) activities in Japan.
- TAC members commented as follows:
 - Though it is concluded that the probability of exceedance of 1000 gal is of the order of 10^{-5} - 10^{-6} in the executive summary, the mean value of the probability for the period of 0.02s is about 7×10^{-5} . The summary should be carefully made in terms of periods and uncertainties so as not to mislead the readers.
 - The usage of the BPT model in logic trees and the difference between the BPT model and the Poisson process should be discussed in another meeting.
 - Ikata3 is located on a very stiff hard rock site and can have risk-significant components with a natural frequency of 100Hz. Is the reason for no consideration of the period of 0.02 sec or less in the Ikata SSHAC Project because there is no regulatory requirement for that in Japan?
 - One of the reasons might be that the time history of ground motion is obtained at only 0.01s intervals and it is difficult to evaluate the response of equipment with natural frequencies of more than 50Hz.
 - We plan to issue the TAC letter about the Ikata SSHAC Level 3 Project. The TAC members will discuss the contents of the letter and ask necessary questions on the Ikata SSHAC report for writing the letter.