

Summary of the 17th Technical Advisory Committee (TAC) Meeting

Date: November 14(Monday)-18(Friday), 2022
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),
Research staff of the Nuclear Risk Research Center
Industry: Tokyo EPC HD, Kansai EPI, TEPCO SYSTEMS

Proceedings:

In the 17th Technical Advisory Committee meetings, the following issues were reviewed:

- “Overview NRRC Research Plan for FY2023 –Risk-informed Decision-making (RIDM) Promotion–”
- “Overview NRRC Research Plan for FY2023 –Risk Assessment Research–”
- “Overview NRRC Research Plan for FY2023 –External Natural Event Research–”
- “Good Practice of RIDM”
- “Current status of overseas experts’ review and PRA models development of individual utilities”
- “RIDM activities by the utilities”
- “Briefing on Risk-Informed OLM”
- “Tornado PRA”

The following meetings were held closed.

- “Risk communication technology to support risk management - How to communicate the risk information seen from the perspective of the public at community dialogue”
- “Implementation Plan for the Independent Technical Review of the Hamaoka Tsunami PRA”

Monday, November 14, 2022

Topic 1 Overview of NRRC Research Plan for FY2023 –RIDM Promotion–

The NRRC made a presentation of the overview of the FY2023 Research Plan for “RIDM Promotion.” TAC’s advice and comments are as follows.

•Generic Component Reliability

The NRRC published a report on the estimation of generic component reliability for PRA in September 2021. This is a very important step for PRA development in Japan. Please provide TAC with an English version of this report or make a presentation of the data collection, data processing, Bayesian updating, and treatment of uncertainties.

- **PRA Peer Review**

PRA peer review is important for U.S. utilities to employ PRA for risk-informed activities and is welcomed by the U.S. NRC. New risk-informed technologies need peer review from a broad perspective. The ASME/ANS PRA standard defines peer review as one of the most significant factors for the quality assurance of PRA. PRA must be built according to the PRA standard.

- **RIDM Activities**

TAC has never heard about the CV-LRT (Containment Vessel Leak Rate Ttest) study. TAC needs to know the study including the technical scope. (The NRRC will explain the CV-LRT study at the next TAC meeting.)

RIDM applies to a wide variety of issues. PRAs that support RIDM activities should evaluate all hazards, including external events.

Topic 2 Overview NRRC Research Plan for FY2023 –Risk Assessment Research–

The NRRC made a presentation of the overview of the FY2023 Research Plan for “Risk Assessment Research.” TAC’s advice and comments are as follows.

- **Fire PRA, Internal flooding PRA**

The principles of integrated risk-informed decision-making should be used to determine the level of detail that is needed in the analyses of specific hazards. For example, simplified conservative analyses may be adequate for issues that are not important contributors to the overall plant risk from all hazards.

It is not clear how the research results will be utilized (For example, one long-term goal of the fire PRA is to “Optimize fire protection designs in NPPs of Japan.”) The NRRC should coordinate with related organizations such as ATENA to make sure that the research results can be used.

- **Multi-Unit PRA (MUPRA)**

TAC is much interested in this study on seismic events that affect multiple units at a site, and the joint failure probabilities for structures and components. TAC is also interested in the document of a multi-unit PRA methodology for other initiating events that can affect multiple units.

- **Level 2 PRA**

The NRRC has already conducted pilot plant studies for Ikata Unit 3 and Kashiwazaki-Kariwa Unit 7 and had the studies undergo expert reviews. The NRRC needs to consider carefully whether any benefits or new findings could be obtained from another Level 2 PRA study using Hamaoka Unit 4 as a model plant.

- **Spent Fuel PRA**

As in the TAC letter for the FY 2022 Research Plan, TAC again recommends that risk assessment methods of a reactor and an SFP be developed for all operation modes, internal events, and external hazards.

- Level 3 PRA**

TAC again recommends the NRRC should contact the U.S. NRC SOARCA group. This group published a new document related to the uncertainty analyses for integrated Level 2 - Level 3 PRA models, NUREG-2254 in October 2022, and will publish another one for the Surry SOARCA study, NUREG/CR-7262.

Topic 3. Overview NRRC Research Plan for FY2023 –External Natural Event Research–

The NRRC made a presentation of the overview of the FY2023 Research Plan for “External Natural Event Research.” TAC’s advice and comments are as follows.

- Seismic PRA**

The CRIEPI report (Japanese version) on the Probabilistic Seismic Hazard Analysis (PSHA) Implementation Guide is expected to be completed in December 2022. TAC would be grateful if NRRC could share the report with TAC as soon as it is completed.

- Tsunami PRA**

The NRRC should refer to relevant reports of NOAA and the USGS in the United States for the analysis method of event deposits induced by external events such as tsunamis.

NOAA: National Oceanic and Atmospheric Administration

USGS: The United States Geological Survey

- Volcanic ash-fall PRA**

Software for obtaining the hazard curve of volcanic ash-fall should be capable of considering and expressing the uncertainties of volcano-related phenomena.

Tuesday, November 15, 2022

Topic 4 RIDM Team Activities

The NRRC made presentations on “Good Practices for RIDM,” “Current status of overseas experts’ review and PRA model development of individual utilities,” “RIDM activities by the utilities,” and “Risk-Informed OLM”. TAC’s advice and comments are as follows.

- Good Practice for RIDM**

For the entire Japanese utilities to develop good practices and find weaknesses for RIDM, they should identify and document a set of good practice attributes deemed internationally accepted excellence. Then, the utilities can assure that the feedback about weaknesses is based on a common understanding of what good practices are.

- Briefing on Risk-Informed OLM**

It is important to integrate risk assessments for internal and external hazards, at power, and low power/shut down(LPSD) modes. If the regulator hesitates to permit risk increase due to OLM, showing risk reduction during the shutdown will help to gain acceptance. The utilities should identify all issues to be addressed and considered during the study before application to the NRA.

EPRI TR-1011762 focuses on the implementation of the Maintenance Rule (10CFR50.65). It emphasizes the importance of evaluating the risk from internal fires. Since earthquakes significantly contribute to the risk in Japan, seismic risk assessment is necessary for the OLM process.

The most important point for a successful OLM is for ATENA to initiate discussions as soon as possible about changing the Nuclear Regulation Authority's basic framework and philosophy of Technical Specifications.

Wednesday, November 16, 2022

Topic 5 Tornado PRA

The NRRC made a presentation on the outline of "Tornado PRA" Research. TAC's advice and comments are as follows.

Comprehensive attention should be given to both wind-born debris (missiles) and wind loads. Not only tornadic vortices but straight-line winds may also become the cause of high wind damage. Wind load effect on openings of HVAC (heating, ventilation, and air conditioning) systems may be important.

What has been found from the several high-wind PRA studies in the US, many of which are not disclosed, is that the high wind risks for some plants are not particularly small. This is due to the site-wise wind effect, not missiles. Some early reports cover the overview of wind hazard analysis. TAC recommends a careful review of such studies.

The site-specific aspects, such as the number of flying debris should be further considered. Also, the random failures which are not influenced by wind load (e.g., Failure of emergency diesel generators) should be included.

The amount of effort should be prioritized based on risk-informed decisions that consider the high wind contribution to the total site-specific risk from all hazards. The NRRC should consider first developing a simplified comprehensive method for wind, missile hazard, and fragility. If high winds are a significant contribution to the overall plant risk, then, you should improve the important parts of the model.

Thursday, November 17, 2022

[Closed] Exit Meeting

TAC and the NRRC discussed TAC roles, topics of mutual interest, and possible topics in the next TAC meeting.