

January 24, 2017

MEMORANDUM TO: Michael D. McCoppin, Chief
Licensing Branch 2
Division of New Reactor Licensing
Office of New Reactors

FROM: Lynn A. Mrowca, Chief **/RA/**
Probabilistic Risk Assessment and Severe Accidents Branch
Division of Safety Systems and Risk Assessment
Office of New Reactors

SUBJECT: SUMMARY OF CLOSED MEETING ON DECEMBER 16-17, 2015,
BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION AND
KOREA HYDRO AND NUCLEAR POWER CO., LTD., ON
PROBABLISTIC RISK ASSESSMENT AND SEVERE ACCIDENT
TOPICS FOR THE ADVANCED POWER REACTOR 1400 (APR1400)

On December 16-17, 2015, the U.S. Nuclear Regulatory Commission (NRC) (the staff) held a closed meeting with Korea Hydro and Nuclear Power Co., Ltd., (the applicant) to discuss topics related to the APR1400 design certification probabilistic risk assessment (PRA), including severe accidents, open items, and requests for additional information (RAIs). The meeting was closed to enable the discussion of proprietary information. The meeting agenda for the December 16-17, 2015, meeting is available in the NRC Agencywide Document Access and Management System (ADAMS) (Accession No. ML15342A167). The staff's presentation material is available in ADAMS (Accession Nos. ML16019A074 proprietary and ML16019A072 proprietary). The applicant's presentation material also is available in ADAMS (Accession No. ML15349B013).

During the meeting, the staff and the applicant discussed the APR1400 severe accident confirmatory analysis. The staff presented its approach to the APR1400 severe accident confirmatory analysis per Standard Review Plan 19.0. The staff explained its approach for selecting scenarios for the confirmatory analysis, the results the staff calculated using MELCOR for these scenarios, and a comparison to the results the applicant calculated using Modular Accident Analysis Program (MAAP) for these scenarios. The staff also discussed issues it identified as a result of the comparison.

During the meeting, the staff and the applicant also discussed other PRA- related topics. The applicant presented an overview of its PRA platform. The applicant converted its software platform from SAREX to Computer Aided Fault Tree Analysis (CAFTA).

CONTACT: Jason Schaperow, NRO/DSRA
(301) 415-6903

The applicant presented an overview of the conversion process, including a comparison of the CAFTA results to the SAREX results for at-power internal events and internal fires.

The applicant also presented on the CAFTA quantification process. The applicant discussed the PRA model changes made to address errors and configuration control issues. The applicant noted the PRA models for at-power internal events and at-power fires have been converted to CAFTA. The applicant informed the staff that the conversion of the remaining PRA models is anticipated to be completed in the spring of 2016.

The staff and the applicant discussed the following additional items related to the staff's review of the APR1400 PRA and severe accident analysis:

- Estimation of room temperature following a loss of room cooling
- Description of severe accident physical processes/phenomena and Level 2 success criteria
- Screening of shutdown events occurring in a water-solid condition
- Identification of cables requiring fire protection features to prevent damage or spurious component operation
- Evaluation of consequential loss of offsite power for reactor trip and loss of coolant accident and other events that may actuate the engineered safety features
- Human reliability analysis assumptions for operator action to isolate a pipe break
- Comparisons of the total melt mass with the summation of the melt masses of individual constituents
- Duration of emergency containment spray backup system operation.

PRA-related RAIs were developed by the staff's PRA and Severe Accidents branch as well as by other staff branches. During the meeting, the staff acknowledged the need to improve the coordination of these RAIs between the branches to enhance clarity and to reduce the potential for duplication of effort.

The staff presented its proposed schedule for developing the Phase 2 Safety Evaluation Report (SER). The staff stated its expectations that the applicant complete the following tasks prior to the end of Phase 2: a) the PRA software platform conversion and resulting Design Control Document updates and b) responses to RAIs issued during Phase 1.

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OFFICE	NRO/DSRA/SPRA	NRO/DSRASPR	NRO/DSRA/SPRA	NRP/SRNL/LB2
NAME	JSchaperow	HPhan	LMrowca	JSteckel
DATE	1/19/17	1/19/17	1/24/17	1/19/17

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JSchaperow, NRO

HPhan, NRO

LMrowca, NRO

HWagage, NRO

MPohida, NRO

TNakanishi, NRO

SCampbell, RES

JSteckel, NRO