

## Bi-weekly Seismic Call Minutes

Date: 2016-04-06

NRC Attendance: John Vera, Vaughn Thomas, Robert Roche, Ata Istar, Joseph Braverman, Carl Constantino, Rich Morante, Tom Houston

KHNP Attendance: Erin Wisler, Sunguk Kwon, Jungho Kim

KEPCO E&C Attendance: Jinwoo Lee, Jaewan Park, Changkyu Lee, Joohyung Kang, Doyeon Kim, Youngsun Lee, Yunki Cho, Daejoong Kim, Yeonghun Kim, Hoonin Cho, Seokhwan Hur

Public Attendance: None

### Topics:

1. RAI 183-8197, Q 03.07.02-1:

Discussion regarding KHNP's response approach took place during the 2016-03-09 bi-weekly call. KHNP is to provide the convergence criteria which will be used for the ACS SASSI analysis for inclusion of higher modes.

### Discussion

The NRC staff stated the convergence criteria provided were found to be reasonable, but reinforced the position that acceptance of the final RAI response would be predicated on KHNP's ability to demonstrate that convergence has been achieved, and acceptance of the response would not be based on the particular number of modes which have been used in the analysis (the criteria which was provided indicates 16 modes will be used). The NRC staff asked clarifying questions regarding the analysis described in the convergence criteria document. KHNP provided the needed clarification during the call.

2. RAI 199-8223, Question 03.08.01-11

KHNP has revised the RAI response to include the revisions discussed during the bi-weekly call on 2016-03-09 (member forces, development length, and portion beyond RCB). The revised draft was provided to the NRC staff on 2016-03-18.

### Discussion

The NRC staff stated that the response was nearly acceptable, but the response did not include all the information contained in the 2016-03-

23 teleconference agenda. The NRC staff requested that the information which was presented in the 2016-03-23 teleconference agenda be added to the body of the response and that the DCD be updated to include the information as well. KHNP stated that the agenda was not at hand and the issue would need to be discussed internally before KHNP could agree to provide the information in the response and in the DCD. The NRC staff requested being informed once KHNP has made a decision regarding the inclusion of the information. KHNP agreed that the NRC staff would be immediately informed.

**ACTION: KHNP is to determine if the information included in the 2016-03-23 teleconference agenda can be included in the RAI response and the DCD, and have the WDCC Licensing Engineer inform the NRC staff.**

3. RAI 199-8223, Question 03.08.01-13

The NRC staff is to comment on the acceptability of the draft response provided on 2016-03-18 and the appropriateness of using the prestressing system's vendor name in the DCD.

Discussion

The NRC staff stated that the Office of the General Council (OGC) has been contacted and feedback should be available for the next call. There were questions regarding the VSL brochures which KHNP had provided. The NRC staff asked why the English version of the brochure provided three different concrete options while the Korean version provides no options (specifically mentioned was the 80 mm value the bearing plate "B" for the 23/28 & 28/35 MPa concrete in the English version does not match the 75 mm value presented in the Korean version). The NRC staff stated that KHNP should provide further information regarding the relationship between the English version of the brochure and the Korean version of the brochure, and communicate what information is relevant to the APR1400 design. KHNP stated the Korean version of the brochure would be translated into English and provided for information.

**ACTION: KHNP is to translate the Korean version of the VSL brochure into English and describe what information is applicable to the APR1400.**

4. RAI 252-8299, Question 03.07.02-9

KHNP is still examining the cause of the abnormal ISRS for the S05 profile. KHNP anticipates the supplemental response can be produced by 2016-05-27.

Discussion

The NRC staff stated understanding that KHNP will not be able to respond to the RAI until the indicated date. The NRC staff emphasized the need for KHNP to provide an explanation of why the experienced behavior of the EDGB and DFOT occurs. The NRC staff stated that there is a lack of information regarding this issue; since there is no clear path to closure, the RAI cannot be considered as a Phase 2 open item. The NRC staff asked that KHNP provide any intermediate updates regarding progress in resolving the issue. KHNP stated that efforts to determine the cause of the EDGB and DFOT behavior are ongoing, and confirmed that the NRC staff would be made aware of progress made.

5. RAI 252-8299, Question 03.07.02-7, 10, and 12

Discussion regarding the NRC staff's feedback is to take place.

Discussion

Question 03.07.02-7

The NRC staff stated KHNP's exclusion of live loads in the dynamic model is not in alignment with NRC guidance. It was stated that KHNP can either include 25% of the live loads or may defend the current position by quantitatively discussing 1) that slabs are flexible, 2) the expected change in frequencies between the live loads being excluded vs. included, and 3) the differences in the results with the live loads excluded vs. included. Next, the NRC staff raised concerns regarding a lack of clarity regarding how slabs are modeled in the seismic and structural design models. KHNP is clarify what slabs are explicitly modeled in the seismic and structural design models and what slabs are modeled as masses in those models. KHNP is to also specifically address 1) what the basis is for slabs being modeled as masses, 2) how is the seismic analysis performed for those slabs, since they are not modeled, and 3) how the slabs are designed. The NRC staff pointed out that the response approach regarding live loads provided by KHNP for the call is not aligned with statements made in DCD Section 3.8.1 and 3.8.3.3, and that there might be a need to revise the DCD.

**ACTION: KHNP is to revise the response to address the NRC staff's concerns regarding the exclusion of 25% of the live loads and to**

**provide a detailed description of slab modeling in the seismic and structural design models.**

Question 03.07.02-10

The NRC staff stated that KHNP's response approach was not satisfactory. The NRC staff stated that performing modal analyses on the most flexible wall in each level will not satisfy the concern. It was stated that KHNP needs to show that the model accurately captures the out of plane responses of walls to ensure that design inputs are accurate, and that by providing the requested information (identify all walls with fundamental frequencies lower than 50 Hz, providing the ANSYS fine and course mesh model frequencies, providing the dimensions for those walls, and providing the mesh size for those walls), the NRC would be able to determine the model is sufficient. The NRC stated that KHNP could alternately try to defend a position which claims there is no design input from the out of plane responses of the walls by identifying the walls of interest, confirming there is no equipment or components to be mounted on those walls, and describing what analysis would be performed if any equipment or components were to be mounted on those walls at a later point in time. KHNP confirmed understanding of the NRC's concerns and the need to revise the response approach.

**ACTION: KHNP is to revise the response approach in a manner which addresses the NRC staff's concerns.**

Question 03.07.02-12

The NRC staff indicated that the response provided was acceptable. KHNP indicated that the final response would be provided by 2016-04-08.

#### **BEYOND THE AGENDA**

RAI 183-8197, Question 03.07.02-4

The NRC staff stated the response approach was acceptable; however, the response only addresses the RCB, and the EDGB and the DFOT also need to be included. KHNP stated the response would be revised to include the EDGB and the DFOT.

**ACTION: KHNP is to provide a date by which the response will be revised to include the EDGB & DFOT and provided to the NRC.**

RAI 227-8274, Q 03.08.04-4

The NRC staff stated the response was nearly acceptable but requested that KHNP explain why the soil and surcharge load ( $L_g$ ) is only applied up to the design groundwater level (two feet below grade) instead of

up to grade. KHNP stated that an explanation could not be given during the call and that a response would be provided later.

**ACTION: KHNP is to explain why  $L_g$  is only applied up to two feet below grade.**

RAI 227-8274, Q 03.08.04-9

The NRC staff stated the response is acceptable. KHNP stated the response would be submitted by 2016-04-15.

**ACTION: KHNP is to submit the response.**

RAI 199-8223, Q 03.08.01-9

The NRC staff stated that the response should provide a markup for DCD Section 3.8.2.7 which provides similar information to what had already been included in the response. KHNP stated the feedback would be considered.

**ACTION: KHNP is to communicate if the NRC staff's feedback will be incorporated and provide a date by which the revised draft response will be provided.**

RAI 227-8274, Q 03.08.04-1

The NRC staff stated the response is acceptable. KHNP stated the response would be submitted by 2016-04-15.

**ACTION: KHNP is to submit the response.**

RAI 182-8160, Q 03.07.01-4

The NRC staff stated that the response was not received on 2016-03-15, as indicated in the "Outstanding Draft RAI Responses" table. KHNP stated the response would be resent, and the table will be updated accordingly. After the teleconference, it was determined that an attempt to send the response had been made on 2016-03-15 but was not received due to file size. The response was divided and sent to the NRC staff on 2016-04-06 and the table was updated to reflect the date the response was received.

Time History Seed Records

The NRC stated that KHNP had committed to provide the time history seed records by December, 2015; however, the NRC staff does not have the time history seed records. KHNP stated the matter would be looked into, and the records would be provided. After the call, it was determined that during the October, 2015 meeting discussions regarding RAI 182-8160, Q 03.07.01-2 resulted in the NRC staff asking that the time history seeds be for Nahanni and Northridge be provided. In response to that question, KHNP submitted various other data via CD, but did not provide the time history seed records.

**ACTION: KHNP is to provide the NRC staff with the time history seed records.**

**Outstanding Draft RAI Responses**

RAI	Question	Draft Due Date	Draft Provided	Feedback Provided	Action With
182-8160	03.07.01-4	N/A	4/6/2016	N	NRC
252-8299	03.07.02-7	7/31/2016	N	N/A	KHNP
252-8299	03.07.02-7 item a.)i.)	TBD	N	4/6/2016	KHNP
252-8299	03.07.02-9	5/27/2016	N	N/A	KHNP
252-8299	03.07.02-10	TBD	N	4/6/2016	KHNP
252-8299	03.07.02-11	7/31/2016	N	N/A	KHNP
252-8299	03.07.02-12	N/A	3/22/2016	3/31/2016	KHNP (to be submitted)
129-8085	03.08.01-1	N/A	2/19/2016	N	NRC
129-8085	03.08.01-4	N/A	3/29/2016	N	NRC
226-8235	03.07.02-5	4/15/2016	N	N/A	KHNP
226-8235	03.07.02-6	8/12/2016	N	N/A	KHNP
183-8197	03.07.02-1	8/12/2016	N	N/A	KHNP
183-8197	03.07.02-4	TBD	N	4/6/2016	KHNP
199-8223	03.08.01-8	4/29/2016	N	N/A	KHNP
199-8223	03.08.01-9	TBD	N	4/6/2016	KHNP
199-8223	03.08.01-10	4/10/2016	N	N/A	KHNP

199-8223	03.08.01-11	TBD	N/A	4/6/2016	KHNP
199-8223	03.08.01-13	TBD	N/A	4/6/2016	KHNP
200-8225	03.08.02-2	N/A	4/4/2016	N	NRC
227-8274	03.08.04-1	N/A	3/4/2016	4/6/2016	KHNP (to be submitted)
227-8274	03.08.04-3	N/A	3/23/2016	N	NRC
227-8274	03.08.04-4	TBD	N	4/6/2016	KHNP
227-8274	03.08.04-9	N/A	3/4/2016	4/6/2016	KHNP (to be submitted)
267-8301	03.07.03-1	4/8/2016	N	N/A	KHNP
267-8301	03.07.03-3	N/A	3/30/2016	N	NRC
255-8285	03.08.05-7	N/A	4/4/2016	N	NRC
255-8285	03.08.05-18	N/A	3/21/2016	N*	NRC
253-8300	03.07.01-5	N/A	3/30/2016	N	NRC
253-8300	03.07.01-8	N/A	4/4/2016	N	NRC

\*Contents of the response are dependent upon Question 03.08.05-7