

**NRC Feedback on KHNP's Draft and Final RAI Responses: RAI 129-8085; Q 3.8.1-1, RAI 129-8085; Q 3.8.1-4, and RAI 129-8085; Q 3.8.1-10, RAI 199-8223; Q 3.8.1-13, RAI 227-8274; Q 3.8.4-1, RAI 227-8274; Q 3.8.4-9, RAI 227-8274; Q 3.8.4-4; RAI 183-8197; Q 3.7.2-2**

**(June 16, 2016)**

**RAI 129-8085; Q 3.8.1-1**

Based on prior communications on this RAI:

- a. Acceptable – CI, as conveyed to KHNP before.
- b. KHNP deferred to RAI 252-8299, Question 3.7.2-7; therefore still open.
- c. The staff confirmed that the methodology for computing the hydrogen generation pressure load is acceptable
- d. Acceptable – CI, as conveyed to KHNP before.
- e. and f. The basis for not considering this load on the containment and not considering this load on overall building dynamic response is acceptable. However, the applicant is requested to provide the following:
  1. The information provided by KHNP (KHNP's input) should be included in the RAI response and a summary of the sensitivity study performed should be described in the DCD.
  2. The revised response and the DCD markup should also include the definition and description of the POSRV load on the applicable structures, including the load in the applicable load combinations, and method for combining the safety/relief valve (SRV) load with other loads.
  3. Also confirm that Appendix A to SRP Section 3.8.1 and RG 1.136 criteria related to SRV loads are satisfied or provide an alternate technical basis, and include this information in the RAI response.

**RAI 129-8085; Q 3.8.1-4**

The staff evaluated the draft response to Question 3.8.1-4 and listed the following items that need to be addressed:

1. The applicant needs to coordinate the references listed in the markups contained in its response to Question 3.8.1-4 and Question 3.8.4-3, as well as in the update to Table 3.8-1.

2. For Part b of the response, the deletion of AISC LRFD specification is acceptable. For revision of DCD Table 3.8-1 to address the various references in the table, response defers to response to Question 3.8.4-3. However, the response to Question 3.8.4-3 does not appear to include the markups needed to DCD Table 3.8-1.
3. For Part c, the applicant deferred its response to Question 3.8.4-3. Therefore, the reference section of the application and Table 3.8-1 will be reviewed upon receiving the updated response to Question 3.8.4-3.

**RAI 129-8085; Q 3.8.1-10**

The staff evaluated the draft response to Question 3.8.1-10 and listed the following items that need to be addressed:

1. Regarding the response given for the definition of the more likely severe accident challenges, the staff is coordinating with the appropriate reviewer in this area in order to complete its review.
2. The response indicates that the governing case is NRC RG 1.216, Regulatory Position 3.1 (24-Hour period following the onset of core damage) rather than Section 3.2 (Period following Initial 24 Hours after the onset of core damage). This is also still being reviewed. However, the staff notes that no information was provided regarding the other items contained in Regulatory Position 3.1 (c). Therefore, the applicant is requested to provide a description of its severe accident analysis approach and explain how it compares to the approach described in Position 3.1 (c) of Regulatory Guide 1.216.

**RAI 199-8223; Q 3.8.1-13**

The staff reviewed the final response and found it to be acceptable – Confirmatory Item (CI)

**RAI 227-8274; Q 3.8.4-1**

The staff reviewed the final response and found it to be acceptable – Confirmatory Item (CI)

**RAI 227-8274; Q 3.8.4-9**

The staff reviewed the final response and found it to be acceptable – Confirmatory Item (CI)

**RAI 227-8274; Q 3.8.4-4**

Overall the response is acceptable except it still says, “This load is applied up to maximum elevation of groundwater specified in DCD Tier 2, Table 2.0-1 (0.61m (2ft) below plant grade).” On page 22 of the June 15 agenda, the applicant stated that the formal RAI response will

incorporate the staff's feedback to delete that statement. Staff is awaiting the revised response to this RAI.

**RAI 183-8197; Q 3.7.2-2**

The staff finds that markups to DCD Section 3.7.2.11 (3.7.2.12 as per response to RAI 8323, Question 3.8.1-16) are necessary to reflect the use of RSA and respective comparison with time history analysis results. The staff request the applicant to propose markups to DCD section 3.7.2.12 addressing the following:

The time-history analysis method based on complex frequency response method is used for the seismic analysis of seismic Category I structures.

Response Spectrum Analysis is used to compute the seismic design forces of the containment structure and internal structure in the reactor containment building using the in-structure response spectra at the top of the basemat generated from the seismic soil-structure interaction analysis.

The responses from these two methods are compared and provided in [To be determined by the applicant (e.g. Table 3.7-XX and/or APR1400-E-S-NR-14003-P)]

In the applicant response to Part b regarding the seismic analysis methods used for the seismic Category I structures, the applicant provided a table, Table 3.8A-40, "Summary of Models and Analysis Methods," which lists the models of the APR1400 structures along with the methods used to perform the analysis for each model. The staff reviewed the table and noted the following:

1. In Table 3.8A-40 (1 of 3 through 3 of 3), for the NI building basemat, the Aux building, the EDGB, and the FDOT analysis models, the applicant stated that the static analysis and other analysis methods are used to analyze these structures. The applicant is requested to expand on exactly what loads the static analysis method is used to analyze (e.g., dead load, live load, gravity load, etc.) using these structural models.
2. In Table 3.8A-40 (1 of 3 and 2 of 3), for the NI building basemat, the Aux building, the EDGB, and the FDOT analysis models, the applicant stated that the static analysis and other analysis methods are used to analyzed these structures. The staff reviewed the referenced DCD sections given in the last column of the table, as well as Sections 3.8, 3.7.2, and 3.8A of the DCD and could not identify descriptions for the different analysis methods used to analyze the structural models. The applicant is requested to provide a clear description of each of the analysis methods identified in the table in the appropriate sections of the DCD (Sections 3.8, 3.8A, and/or 3.7.2, as appropriate). Also, identify in the last column of DCD Table 3.8-40 where this information is located in the DCD.
  - For example, in Table 3.8A-40, (2 of 3), for the EDGB, the static analysis, equivalent static analysis, and nonlinear analysis methods are identified. From

this information it is not clear which loads are evaluated using each of these three different analysis methods. The staff reviewed DCD Section 3.8.4.4 (referenced in the last column of the table) as well as Section 3.8A.3.4.2 (which is referenced in DCD Section 3.8.4.4), 3.7.2, and 3.8A and could not find a description of the analysis methods used to analyze the EDGB structural model(s).

3. In Table 3.8A-40 (2 of 3), there are a number of row entries that are identified in the last column as “Not described in DCD.” For each of these row entries, if the structure is seismic Category I then the model, analysis purpose and approach, and computer program, should identified in the DCD. In this case the last column should reference this section of the DCD. For non-seismic Category I structures, the last column could identify the row as “Not applicable” since the structure is not seismic Category I.
3. In Table 3.8A-40 (1 of 3), for the “Reactor containment building internal structure model (uncracked stiffness model), under the column labelled Analysis Method, why is the entry SSE damping also included? In Table 3.8A-40 (2 of 3), for the EDGB and the DFOT building, why are these analyses only performed for shear walls? How are the other structural members like slabs, basemat, columns, etc. analyzed?
5. Note that the KHNP response to RAI 249-8323 Question 03.08.01-15 also provides some information on the computer programs, analysis methods, models, and analysis scope. The response and markups for Table 3.8A-40 and Question 03.08.01-15 should be consistent.