APR1400
Feedback on Draft Response to RAI 208-8245, Question 03.08.03-5
Date: August 22, 2016

The response is acceptable except for addressing the items below related to only Items (a) and (b) of the RAI response.

Item (a)

i) The response provided a Figure 1 to depict a sketch of the concrete slab and steel beam between the containment wall and the SSW. To ensure the proper understanding of the restrain on each side (containment and SSW) confirm whether the connection details shown on Figure 1 provide only the following restraints:

- Containment side: vertical downward restraint by loading through the top of the gusset plate and upward restraint through the bumper angle member. There are no restraints in the tangential, radial, or rotation (moments) about all three perpendicular directions.
- SSW side: Only tangential, radial, vertical (upward and downward), and rotation (torsional moment) about the beam axis. There are no rotational (moment) restraints about the remaining two directions perpendicular to the beam axis.

ii) Table 1 and Table 2 provide the basis for decoupling the slab at Elevation 156 ft. Where is the basis for the other two slabs at Elevations 136'-0" and 114'-0"?

Item (b)

i) The response indicates that seismic response spectrum analyses are performed with the FRS which envelope the containment shell side and secondary shield wall side at each elevation. Since the analysis models of the containment and SSW do not include the slabs in the FEM, then in addition to the inertial loadings provided in the FRS, explain whether seismic anchor movements, similar to those utilized for piping systems as an example, are also included in the slab and connection design, and then added to the seismic inertial loadings. Similarly, confirm whether thermal anchor movements between the containment and the SSW, which develop friction resisting forces in the radial and tangential directions, are also analyzed and included in the design in addition to the other loads.

ii) The second paragraph of the response states that "Each end of the steel beams have a fixed connection at the secondary shield wall and a sliding connection at the containment wall." The

term “fixed connection” is applicable to connections that are restrained in all three translational directions and all three rotational directions. Based on the information provided elsewhere in the response, it appears that neither end of the beam connection to the containment and SSW provide this type of “fixed” restraint. Therefore, please clarify or correct the use of “fixed connection” in two locations of the response.

iii) The second paragraph states that: “The load generated from friction is negligible because the axial load generated from friction is so small.” Based on the information provided, it appears that the connection at the containment is free to move both radially and tangentially. If that is the case, then the statement should be revised and the design should consider friction acting in both directions. Explain whether the friction is based on carbon steel on steel sliding or some special plate material such as lubrite plates. If some special material is used to reduce the friction force, then this should also be identified on the figure. Lastly, regardless of the magnitude of the friction, confirm that it is considered in the design. Otherwise, provide a comparison to demonstrate it is truly negligible.

iv) The second paragraph states that: “The web angle connection supports vertical and axial load.” Explain where this is shown in Figure 1 and the associated section view. The only angle shown there appears to provide only vertical upward restraint and no axial restraint. Also, note that the use of only an angle to provide upward restraint as shown in the figure appears to be flexible and may not be able to resist any meaningful upward load. Therefore, explain how this will be designed or perhaps there may be no upward load if seismic upward load is balanced by dead load.

v) Figure 2 and the fourth paragraph indicate that the only thermal expansion effects on sizing the required gap between the slabs and the containment are based on the thermal expansion of the steel beam in the RCB. Provide the basis for not including potential differential radial displacements between the containment and the SSW. Do both structures always displace the same amount under all thermal load cases?

vi) Attachment 1 provided with the Bi-weekly Seismic Call Agenda, dated 6-1-2016, for RAI Question 03.08.03-5, Item 3, refers to Figure 3 to show the various horizontal surfaces in the RCB compared to those in DCD Tier 2, Figure 1.2-2. However, this figure was not included in the current RAI response. In the structural audit during the week of June 20, 2016, KHNP was also requested to provide this figure. Lastly, the information from Attachment 1, Item 3, related to this item was not included in the current RAI response. Therefore, all of the above information is requested to be included in the RAI response.

vii) Attachment 1 provided with the Bi-weekly Seismic Call Agenda, dated 6-1-2016, for RAI Question 03.08.03-5, Item 5, provided information about how the masses of the slabs are distributed to the SSW and the containment, in each of the three directions for the structural analysis. This information should also be provided in the RAI response. The information probably needs to be adjusted based on the current KHNP connection restraint directions discussed under Item (a) above. For example, in the horizontal direction due to the sliding support in the radial and tangential directions at the containment, the mass distribution should not be based on 50% to the containment and 50% to the SSW. Therefore, the response should be revised and the effects of this revision on the structural analysis which may not have used the updated mass distribution should be addressed.