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February 8, 2012
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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Responses to Requests for Additional Information

Attached are Nuclear Innovation North America LLC (NINA) responses to staff questions in Request for Additional Information (RAI) letter number 415 related to Combined License Application (COLA) Part 2, Tier 2, Section 9.1, "Fuel Storage and Handling." Attachments to this letter contain responses to the following RAI questions:

09.01.02-20	09.01.02-26
09.01.02-21	09.01.02-27
09.01.02-23	09.01.02-29

When a change to the COLA is required, it will be incorporated into the next routine revision of the COLA following NRC acceptance of the RAI response.

There are no commitments in this letter.

If you have any questions regarding these responses, please contact me at (361) 972-7136 or Bill Mookhoek at (361) 972-7274.

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NRO

STI 33302304

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 2/8/12

Scott Head
Manager, Regulatory Affairs
South Texas Project Units 3 & 4

jaa
Attachments:

1. RAI 09.01.02-20 Response
2. RAI 09.01.02-21 Response
3. RAI 09.01.02-23 Response
4. RAI 09.01.02-26 Response
5. RAI 09.01.02-27 Response
6. RAI 09.01.02-29 Response

cc: w/o attachment except*
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RAI 09.01.02-20

QUESTION:

Figure 3-2 of the Technical Report, Rev. 2, shows wall boundaries and gaps between racks and walls. The values of the gaps are consistent with those provided in Table 4-3 of the report. Figure 4-1 of the report shows different perimeter boundaries for the pool walls. There appears to be partitions and equipment storage inside the pool wall boundaries.

The staff discussed this with STP on 12/07/11. STP acknowledged that storage areas will be added to the spent fuel pool, and will change the gaps. However, they have not been designed yet. The gaps assumed for the seismic analysis are the full gaps to the SFP wall. The staff noted that the addition of the storage areas may invalidate the current seismic analysis, which indicates NO wall impact. Reducing the gaps at a later time will be an unanalyzed condition with plant safety implications.

The staff also notes that the fluid coupling calculation between the racks and the pool wall will have to be updated to reflect the final gaps, even if there is adequate remaining gap to preclude impact. At a minimum, the hydrodynamic mass will need to be corrected and the analyses re-run.

The staff requests the applicant to clarify that no such commodities are assumed to be present in the gaps, and to describe how any changes to the gaps will be controlled, evaluated, and documented, to ensure that the design-basis seismic analysis of the racks and the pool walls reflects the actual as-built gap conditions.

RESPONSE:

The purpose of Figure 4-1 was to present the coordinate axes used during the analyses. It utilized a background image that showed an area in the pool available for the storage racks that was separate from the pool walls. Other areas reserved for equipment that has not yet been designed also appeared on that figure. To eliminate confusion, representation will be clarified in the next revision of WCAP-17331-P by only showing the pool walls and the coordinate systems that are used for the analyses. The revised Figure 4-1 is included in the response to RAI 09.01.02-17.

The analysis performed for the racks assumes that no commodities are present in the gaps between the racks and the walls of the Spent Fuel Pool. Any change to this assumption would require a review to be conducted to establish whether or not the change may be made without prior Nuclear Regulatory Commission (NRC) approval based on the regulatory criteria of 10 CFR 50.59. The 10 CFR 50.59 review process is governed by procedures and contains triggers that include: changes to drawings, permanent design changes (such as addition of permanent equipment to the spent fuel pool), and temporary modifications, etc. Such a review would be documented using approved procedures in accordance with the applicant's / owner's NRC-approved Quality Assurance program.

No changes to the COLA are required by the response provided above.

RAI 09.01.02-21

QUESTION:

Figures 4-2 through 4-5 of the Technical Report are unchanged between Revision 1 and Revision 2. No new information about the time history input has been included in Revision 2. RAI 09.01.02-9, parts (a) and (b), had been Confirmatory, pending inclusion of additional information about the time history input.
The staff discussed this with STP on 12/07/11. The applicant indicated that it had decided NOT to include the promised information in Revision 2. Accordingly, the staff requests the applicant to revise its response to RAI 09.01.02-9, to delete the commitment to include additional information in the Technical Report, and also to provide its justification for withdrawing this commitment.

RESPONSE:

The response to RAI 09.01.02-9 has been revised to remove the statement indicating that the detailed tables and figures would be added to the technical report. As described in the revised response to RAI 09.01.02-9, the spent fuel rack Technical Report will be revised to add a statement in the next revision that provides a summary statement that the synthetic time histories are developed in accordance with the guidance of SRP Section 3.7.1, and satisfy the criteria described in the SRP for acceptable synthetic time history characteristics.
The level of detail provided in the response to RAI 09.01.02-9 is considered to be too detailed for inclusion in the Technical Report, which is a summary report. Adding the summary statement is an appropriate means of capturing that the SRP criteria are met, without adding excessive detail. It is also noted that the use of a summary statement is consistent with another applicant's technical report on this same subject.

No COLA changes are required as a result of this RAI response.

RAI 09.01.02-23

QUESTION:

In the Technical Report, Revision 2, Section 4.2.2, the applicant states:

> "For the validation and WPM rack finite element models, some specific details of the rack construction differ from the design specified in Section 3 and Appendix A. The detailed stress analyses of all rack components are consistent with the design specified in Section 3 and Appendix A. Changes to the design were implemented after the completion of the WPM analyses to address design issues. These changes to the design affect local regions of the rack and will not have a significant impact on dynamic characteristics of the rack. Therefore, the results from the WPM analyses are valid. Specific details on the differences between the rack finite element model and the design are discussed throughout the model discussion."

To assist the staff in reaching a conclusion that the differences are collectively insignificant, the staff requests the applicant to provide a summary description of each difference, an assessment of the individual effect of each difference on the dynamic characteristics of the racks, and an assessment of collective effect of all differences on the dynamic characteristics of the racks.

RESPONSE:

Summary of differences between the FE model and the detailed design
The dynamic model finite element representation of the spent fuel storage racks differs from the final design due to in-process design changes. The following is a summary of design differences:

Change Number	Description of difference	WCAP Location
1	The modeled width of the 10 x 10 rack is smaller than the design width.	Figure 4-6, Sketch A-1
2	Leveling screw is modeled as a smaller diameter than the design diameter	4.2.2.1
3	The modeled rack linkage assembly dimensions are smaller than the design dimensions. The lug and clevis system is modeled as a 1-2 lug and clevis, but the design has been modified to be a 2-3 lug and clevis. The lugs and clevis' are not as tall in the model as the design heights.	4.2.2.1, FEM dimensions in Figure 4-9, Design dimension in Sketch A-9, A-10
4	Rack-to-wall gaps in the model are different than the design gaps.	Table 4-4

Change number 1 is not discussed in detail in the WCAP, however it is discussed in the supporting calculation note. The FEM rack width is smaller because the weld spacers between cells are not modeled. The cell width used is the nominal cell width, and this results in a slightly narrower rack. This modeling methodology is consistent with previous analysis methods and rack licensing submittals. The effect of a smaller rack on the dynamic model would be to increase the chance of rack tipping. Even though spent fuel racks are tied together, rotation of a rack and the subsequent impact of the level screw with the floor is considered the limiting load experienced by the rack. Therefore, a rack more prone to tipping would produce conservative rack-to-floor impact loads.

Change numbers 2 and 3 are local increases in the size of the leveling screw and the rack tie system. These changes were implemented after performing the dynamic runs in response to locally high stresses. These local changes do not significantly change the overall rack weight. Also, the dynamic response of the rack is dominated by the stiffness of the tall, slender, rack 10 x 10 cell structures. Therefore, the overall dynamic response is not significantly affected by these differences. The changes in geometry are considered in the stress evaluations.

Change number 4 has two consequences to the dynamic model. The first is the effect of the change in gap size on the hydrodynamic coupling term calculations. The fluid coupling term is dependent on the smallest fluid gaps. Refer to Table 4-4. The gap difference for the smallest gap (actual gap minus analysis gap) represents less than a 2% change in the gap. In addition, this gap condition exists along a very small portion (less than one rack width) of the rack assembly perimeter. All other gap differences are negative (gaps are smaller than what was modeled). The actual gaps are, at most, 4.7% less than the modeled gap. The decrease in gap size would increase the coupling term. The increased coupling term would reduce the rack structure sliding, which would reduce rack-to-pool floor impact loads and the likelihood that the racks would impact the pool wall.

The second consequence of the change in gap size is the increased chance that the racks might hit the pool wall. The maximum displacements of the rack structure are smaller than the reduced gap sizes. Therefore, rack impact with the pool wall is not a concern.

The net effect of all the differences will not significantly affect the dynamic behavior of the whole pool model.

No changes to the COLA are required by the responses provided above.

RAI 09.01.02-26

QUESTION:

RAI 09.01.02-2 Response, Revision 1, page 3, states: "Refer to WCAP-17331-P, Revision 2, Sketch A-2. The size and weight of the fuel contained within the rack have not changed." However, the size and weight of the fuel is not in the referenced figure. To assist the staff in its review, a description and sketch of the analyzed fuel assembly, including size and weight is needed. The staff also needs clarification whether the exact same fuel assembly (referred to as the DCD fuel assembly) has been assumed for all calculations and analyses (i.e., seismic analysis; accidental drop analysis; impact stiffness calculations; impact load capacity vs. demand).

The staff discussed this with STP on 12/14/11. The applicant indicated that it has no information about the "DCD fuel assembly" other than the information in the ABWR DCD, and any other publicly available sources.

It is not clear to the staff what actual information and what assumed information was used to calculate the axial and bending stiffness of the "DCD fuel assembly" model for the seismic analysis. The staff requests the applicant to describe in detail its method to calculate the axial and bending stiffness for the fuel assembly, and to clearly identify the actual and assumed geometry and material properties used in the calculations. For assumed values, provide a technical basis for their selection.

RESPONSE:

To develop the simplified stick model of the DCD fuel assembly, Westinghouse started with a detailed finite element ANSYS model of a Westinghouse SVEA-96 Optima2 BWR fuel assembly. In their calculation, Westinghouse created a simplified stick model of the Optima2 fuel assembly that accurately depicts the more detailed finite element model. To measure the accuracy of the simplified model the total mass, center of gravity, and modal response was compared to the detailed finite element model. The result of the calculation was a simplified stick model that accurately represented the dynamic behavior of an Optima2 fuel assembly.

To create the simplified model of the DCD fuel, Westinghouse altered the mass and moment of inertia of the simplified stick model such that the mass and first fundamental frequency matched published data for typical 8x8 fuel assemblies. These 8x8 fuel assemblies are representative of the fuel assemblies detailed in the DCD. The end result was a simplified stick model of a fuel assembly with mass and dynamic properties representative of the DCD fuel.

No changes to the COLA are required by the responses provided above.

RAI 09.01.02-27

QUESTION:

The footnote to Technical Report, Revision 2, Table 3-3, "STP 3&4 Spent Fuel Storage Rack Material Data", states that "Materials are dual certified to TP304/304L". This footnote applies to most of the components that make up the rack. The staff notes that the stainless steel properties given in Technical Report, Revision 2,Table 5-1, have been revised to include the properties of Type 304 stainless steel, and that the TP304 properties are used in design calculations for the components identified as "dual certified" in Table 3-3.

Code-specified stress limits are typically based on either the specified material tensile strength or the specified material yield stress, from the applicable ASTM specification (in this case A240 for plate material). The code stress limits for Type 304L stainless steel are generally lower than those for Type 304. Provide specific information about ultimate strength and yield stress for the dual certified TP304/TP304L material that justifies the use of TP304 code stress limits.

RESPONSE:

Material dual certified to ASTM A240 Type 304/304L not only meets the minimum mechanical requirements of Type 304 material such as yield strength, tensile strength, and hardness, but also meets the low carbon content required for 304L material. The material will have a minimum yield strength of 30 ksi and a minimum tensile strength of 75 ksi.

No changes to the COLA are required by the responses provided above.

RAI 09.01.02-29

QUESTION:

Technical Report, Rev. 2, Section 8.5, page 8-25, (and the response to RAI 09.01.02-8) discusses the thermal stress effects of an isolated hot cell. The assessment assumes that the hot cell temperature is 160.8°F and the uniform temperature is 150.8°F, representing a $\Delta T = 10°F$. The staff notes that recent DCD applicants have assumed a ΔT of 50°F or greater for this same calculation.

The ABWR DCD Rev 04, Section 9.1.2.1.5, states that the normal pool water operating temperatures are 16°C to 66°C (60.8°F to 150.8°F). What is the technical basis for assuming the uniform temperature is 150.8°F, and not 60.8°F? Have detailed thermal hydraulic analyses of the pool been performed for a range of operating scenarios? Is $\Delta T = 10°F$ the worst case of all scenarios?

RESPONSE:

Thermal stress effects of an isolated hot cell were analyzed for a ΔT of 50°F and found to be acceptable. Thermal hydraulic analyses of the Spent Fuel Storage Racks confirm that this assumed ΔT is bounding. The results of this thermal stress analysis will be incorporated in the next revision of WCAP-17331-P.

No changes to the COLA are required by the responses provided above.