PROPRIETARY

Nuclear Innovation
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4000 Avenue F, Suite A
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November 14, 2011
U7-C-NINA-NRC-110139
10 CFR 2.390

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville MD 20852-2738

South Texas Project
Units 3 and 4
Docket Nos. 52-012 and 52-013
Response to Requests for Additional Information and Submittal of Technical Report

References:
1) Letter, Scott Head to Document Control Desk, "Response to Requests for Additional Information," dated June 23, 2011, U7-C-NINA-NRC-110084 (ML11178A073)
2) Letter, Mark McBurnett to Document Control Desk, "Response to Request for Additional Information," dated August 1, 2011, U7-C-NINA-NRC-110105 (ML11216A224)
3) Letter, Scott Head to Document Control Desk, "Revised Response to Request for Additional Information," dated August 17, 2011, U7-C-NINA-NRC-110109 (ML11234A270)
4) Letter, Scott Head to Document Control Desk, "Submittal of Technical Report," dated January 25, 2011, U7-C-NINA-NRC-110004 (ML110270170)

Attached are the responses to NRC staff questions included in Request for Additional Information (RAI) letters numbered 377, 412 and 413 and supporting Technical Report WCAP-17331, Revision 2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design." These responses and Technical Report are related to Combined License Application (COLA) Part 2, Tier 2, Section 9.1, "Fuel Storage and Handling." Responses to Specific RAIs of letter 377 were previously provided by references 1, 2 and 3. This letter completes the response to the remaining RAIs in letter 377 and where indicated revises responses previously provided. This letter also completes the response to letters 412 and 413. It should be noted that the RAIs related to new fuel racks have been answered by reference to

STI 33052076

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STP DEP T1 2.5-1, "Elimination of New Fuel Storage Racks in New Fuel Vault," which was incorporated in Revision 6 of the STP 3 & 4 Combined License Application.

The attachments provide proprietary and non-proprietary versions of Technical Report WCAP-17331, Revision 2, and responses to the RAI questions listed below:

NRC Letter Number 377:

09.01.02-2b (and 09.01.02-2a, Rev.1 and 09.01.02-2h, Rev.1, both in response to RAI 09.01.02-11 below)

09.01.02-3a (initial response), 3b, Rev.1 (and 3c, Rev.1 in response to RAI 09.01.02-12 below)

09.01.02-4, Rev.1

09.01.02-6a Rev. 1, 6b, 6c, 6d ,6e and 6f Rev. 1

09.01.02-8, Rev.1

09.01.02-5c, 5g, 5i, 5j, 5m and 5n, Rev.1 (proprietary and non-proprietary)

NRC Letter Number 412

09.01.02-10 (proprietary and non-proprietary)

NRC Letter Number 413:

09.01.02-11

09.01.02-12

09.01.02-13

09.01.02-14

09.01.02-15

09.01.02-16

COLA changes will be incorporated in the next routine revision of the COLA following NRC acceptance of the RAI responses.

Several of the RAI responses and the Technical Report (WCAP-17331, Revision 2) include proprietary information. This letter transmits proprietary and non-proprietary versions of the applicable RAI responses and Technical Report. Proprietary RAI response 09.01.02-5, Rev.1 (Attachment 20) is proprietary to Westinghouse Electric Company, LLC (Westinghouse) and proprietary RAI response 09.01.02-10 (Attachment 21) and the proprietary Technical Report (Attachment 22) are proprietary to both Westinghouse and Toshiba Corporation Power Systems Company (Toshiba).

Attachments 1 through 19 contain the non-proprietary versions of the RAI responses, supporting Technical Report, matrix and affidavits. When separated from the proprietary material in Attachments 20, 21, and 22, this letter is not proprietary.

The specific information in the RAI responses and Technical Report considered proprietary to Westinghouse are supported by affidavits (Attachments 16, 17, and 18) signed by Westinghouse, the owner of the information. The affidavits set forth the basis on which the information may be

withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of Section 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Westinghouse be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Correspondence with respect to the copyright or proprietary aspects of the items listed above or the supporting Westinghouse Affidavit should reference CAW-11-3280, 3281or 3298 as applicable, and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Similarly, the specific information in the RAI response and Technical Report considered proprietary to Toshiba is supported by affidavit (Attachment 19) signed by Toshiba, the owner of the information. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in 10 CFR 2.390 of the Commission's regulations. Accordingly, it is respectfully requested that the information which is proprietary to Toshiba be withheld from public disclosure in accordance with 10 CFR 2.390 of the Commission's regulations. Correspondence with respect to the proprietary aspects of the items listed above, or the supporting affidavit, should be addressed to: Yasuhiro Yuguchi, Group Manager, Toshiba Corporation Power Systems Company, Nuclear Energy Systems & Services Division, System Design and Engineering Department, 8 Shinsugita-Cho Isogoku-Ku, Yokohama 235-8523 Japan.

Attachment 15 is provided as a cross reference matrix between the RAI responses and the supporting Technical Report. It is intended only as an aid in reviewing the responses but does not constitute any part of the RAI responses in this transmittal.

Please note that the criticality methodology for the STP 3 & 4 spent fuel racks was developed and documented in WCAP-17375-P Revision 0, which was submitted to NRC via reference 4. The methodology provided in this report includes development of the upper subcritical limit (USL) for the STP 3 & 4 ABWR fuel racks. Using this methodology, an analysis for the DCD fuel design, including an analysis for a bounding fuel enrichment, was provided in Appendix A of WCAP-17375-P, which demonstrates significant margin to the USL. The spent fuel rack design in that report was the same design used in the spent fuel rack structural analysis presented in Revision 0 and Revision 1 of WCAP-17331-P. In the course of responding to RAIs and completing the final structural analysis of the spent fuel racks, it was necessary to modify certain details of the design. The modifications are documented in WCAP-17331-P Revision 2 (Attachment 22 of this transmittal). After a review of these modifications, it was determined that the only change that would impact the criticality analysis was an increase in the thickness of the rack cell walls. This change to the cell wall thickness has been assessed and determined not to affect the methodology or USL calculation in WCAP-17375-P previously submitted and reviewed by the NRC. However, in reviewing this criticality WCAP it was determined that there are some unrelated typographical errors, which will be corrected in a revision to WCAP-17375-P. As part of this revision, a discussion of the assessment of the revised rack cell wall thickness will be added. The revised WCAP-17375-P (Revision 1) will be submitted to the NRC by December 1, 2011.

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.

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

Executed on 11/14/11

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

jaa

Attachments:

1. RAI 09.01.02-2 Response Revision 1 (non-proprietary)
2. RAI 09.01.02-3 Response Revision 1 (non-proprietary)
3. RAI 09.01.02-4 Response Revision 1 (non-proprietary)
4. RAI 09.01.02-5 Response Revision 1 (non-proprietary)
5. RAI 09.01.02-6 Response Revision 1 (non-proprietary)
6. RAI 09.01.02-8 Response Revision 1 (non-proprietary)
7. RAI 09.01.02-10 Response (non-proprietary)
8. RAI 09.01.02-11 Response (non-proprietary)
9. RAI 09.01.02-12 Response (non-proprietary)
10. RAI 09.01.02-13 Response (non-proprietary)
11. RAI 09.01.02-14 Response (non-proprietary)
12. RAI 09.01.02-15 Response (non-proprietary)
13. RAI 09.01.02-16 Response (non-proprietary)
14. WCAP-17331-NP, Rev.2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (non-proprietary)
15. Cross Reference Matrix (RAI Responses to WCAP-17331, Revision 2)
16. CAW-11-3311, Westinghouse Affidavit for Proprietary RAI 09.01.02-5, Rev.1
17. CAW-11-3281, Westinghouse Affidavit for Proprietary RAIs 09.01.02-10
18. CAW-11-3298, Westinghouse Affidavit for WCAP-17331-P, Rev.2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design"
19. Toshiba Affidavit for Proprietary RAI 09.01.02-10 and WCAP-17331-P, Rev.2
20. RAI 09.01.02-5 Response Revision 1 (proprietary)
21. RAI 09.01.02-10 Response (proprietary)
22. WCAP-17331-P, Rev.2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (proprietary)

cc: w/o attachment except*
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RAI 09.01.02-2

QUESTION:

Summary: Provide more descriptive information on pools, racks and fuel-handling system.

Westinghouse Electric Company LLC, WCAP-17311-P, Rev. 1, "Structural Analysis Report for STP Units 3 & 4 New Fuel Storage Rack Baseline Design," and WCAP-17331-P, Rev. 1, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (hereafter referred to as Technical Report(s)), were submitted by the applicant in response to the staff's request, identifying the need for more detail than what was included in Rev. 0 of the reports. While Rev. 1 does provide additional detail, it is still insufficient for the staff to conduct its review in accordance with the guidance in SRP Section 3.8.4, Appendix D (Rev. 3). To ensure compliance with 10 CFR 50, Appendix A, General Design Criterion (GDC) 2, as it relates to the design of safety-related structures being able to withstand the most severe natural phenomena such as earthquakes, additional descriptive information, as delineated in SRP 3.8.4, Appendix D, is needed. Also, as indicated in Section I of SRP 3.8.4, Appendix D, the applicant should provide plans and sections showing the racks, pool walls, liner, and details of the fuel-handling system (for the staff's review of the parameters associated with the postulated drop accident).

The staff requests the applicant to provide the following descriptive information, and update the new and spent fuel racks technical reports, as appropriate:

a. Sketches to show all the major structural features with sufficient information to describe the racks, including the cover plate, baseplate, support screws, support plate, pool liner, weights of racks with various sizes, all welds connecting these parts, any other elements in the load path of the racks, water height in the pool, and plans and sections showing the spent fuel pool in relation to other plant structures. These sketches should indicate related information, including the north arrow, cutouts, dimensions, material thicknesses, and weld size/thickness.

b. Provide information about gaps: a) Gaps in both horizontal directions and between racks, rack to wall, and rack to equipment area boundary should be provided in pool plan and cross section views; b) Clarify whether there is any gap between the four racks in the new fuel pit; c) Identify the gap tolerances for each of the gaps between the fuel to cell wall, rack to rack, rack to equipment area, and rack to wall; d) Explain whether any studies were done for different initial gap conditions considering the potential tolerances, and if not, explain why; and e) Explain whether there are any requirements to ensure that the assumed gaps (considering tolerances) will be maintained throughout the licensing period, in particular following a seismic event.

c. In appropriate sections of the Technical Reports, provide ASTM designations, material types and properties for all major components such as support plate, support block, baseplate, cover plate and weld metal material.

d. Are all fuel racks required to be permanently installed in the pool or pit? If not, provide technical justification or additional studies.

e. Figure 3-2 of the new fuel rack Technical Report shows that there is no connection between adjacent cell walls. Confirm this is true, or correct the figure. In the same figure, the enlarged detail at the upper right corner should show wrapper plate. Same questions also apply to Figure 3-3 of the spent fuel rack Technical Report.

f. Section 3 of the new fuel rack Technical Report states that the new fuel racks are anchored to the floor of the new fuel vault at each support foot location. However, Item 2 of Subsection 9.1.1.3.2 of STP 3 & 4 FSAR Rev. 04 states that the new fuel storage racks are supported vertically from a base that is not anchored to the bottom of the fuel vault. Explain the inconsistency. If the Section 3 statement referenced above is true, provide a sketch and description of how the new fuel racks will be anchored down to the pit floor.

g. For the spent fuel racks, clarify and show on related figures the number/locations of support feet of various racks.

h. Figures of rack geometry and isometric view show that some exterior cells of fuel racks are covered by the neutron absorbing material for three sides only. Explain why.

i. Provide types of welds for all weld connections.

REVISED RESPONSE:

NINA provided responses to RAI 09.01.02-2 items a. and c. through i. on June 23, 2011, in letter U7-C-NINA-110084 (ML11178A073). Preliminary comments and requests for clarification from the NRC were received and discussed on July 13 and July 20, 2011. This revision incorporates those clarifications and the response to item b.

STD DEP 9.1-1 was revised and submitted separately along with a new Tier 1 departure, designated STP DEP T1 2.5-1, to remove the New Fuel Storage Racks from the New Fuel Vault on July 19, 2011 in letter U7-C-NINA-NRC-110098 (ML11202A268). This change eliminates the need for a separate design for New Fuel Storage Racks. The new fuel will be stored in the Spent Fuel Storage Racks located in the Spent Fuel Storage Pool. Therefore the Technical Report for the new fuel storage racks, Westinghouse Electric Company LLC, WCAP-17311-P, Revision 1, "Structural Analysis Report for STP Units 3 & 4 New Fuel Storage Rack Baseline Design," need not be reviewed further. The Technical Report, WCAP-17331-P, Revision 1, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design," has been revised to address issues contained in RAIs 09.01.02-2 through 09.01.02-9 for the spent fuel storage racks located in the Spent Fuel Storage Pool. In order to assure consistency, detailed information that is provided in the Technical Report has been removed from this response with appropriate references made in the following discussion.

This response also addresses the supplemental RAI 09.01.02-11 (No. 6070 Revision 6) to RAI 09.01.02-2 parts (a) and (h).

This response revision supersedes the previous response in its entirety.

a. The spent fuel rack design is detailed in WCAP-17331-P Revision 2, Section 3. Additional rack design sketches are provided in Appendix A of the WCAP.

In Supplemental RAI 09.01.02-11 (No. 6070, Revision 6) to RAI 09.01.02-2, part (a) the staff requests that the applicant provide the following information to assist in completing its technical review:

1. [RAI 09.01.02-2] Sketch 3 shows the spent fuel storage boundary. Clarify what the spent fuel storage boundary represents.

2. [RAI 09.01.02-2] Sketch 4 shows two groups of racks and a 11.77" gap between the two groups. Explain whether all adjacent racks are tied together. If yes, provide the linkage design details for two racks with an 11.77" gap. If not, what is the maximum horizontal differential movement between the two rack groups during a seismic event?

3. [RAI 09.01.02-2] Sketch 6 shows that the overall height of the rack is now 180.1", which was 198.1" according to the Technical Report, Revision 1. Explain whether the size and weight of fuel assembly also have been changed. If yes, provide the updated values.

4. [RAI 09.01.02-2] Sketch 13 shows conceptual rack-to-rack linkage at the top of racks. During conference calls, the applicant stated that the 1/2" plates will be welded to the rack on each cell. The 0.1" thick cover plates are welded to cell wall faces with an overlap, creating a 0.1" mismatch between the cell wall external surface and the cover plate external surface. The staff requests that the applicant explain how the 1/2" plates will be welded to both the cover plates and the cell walls.

Responses:

1. WCAP-17331-P Revision 1 included a sketch of the fuel rack pool layout in Figure 3-1. This figure identified a spent fuel storage boundary. This boundary originally represented the area intended for spent fuel storage racks. It did not represent a physical boundary within the pool. In WCAP-17331-P Revision 2, the fuel rack pool layout is defined in Figures 3-1 and 3-2 and was updated to show the spent fuel pool wall boundaries instead of the fuel storage boundary. The spent fuel pool wall boundaries provide a more meaningful geometry for the figures and the analysis.

2. Refer to WCAP-17331-P Revision 2, Figure 3-2. The two groups of racks are not tied together. For the partially loaded configuration, WCAP-17331-P, Revision 2

Load Case 6, the two groups of racks contact. WCAP-17331-P, Revision 2, Section 8.2.4 evaluates the rack structural integrity due to the rack-to-rack impact load. Evaluation details are provided in WCAP-17331-P, Revision 2, Reference 3.

3. Refer to WCAP-17331-P Revision 2, Sketch A-2. The size and weight of the fuel contained within the rack have not changed.

4. The nominal gap between the cell wall and the 1/2" support bands is 0.10 inches in the locations discussed above. The AWS structural welding code for stainless steel (AWS D1.6, section 5.4) allows for a gap up to 3/16".

b. Gap Information
a) Gaps in both horizontal directions and between racks, rack to wall, and rack to equipment area boundary should be provided in pool plan and cross section views;

WCAP-17331-P Revision 2, Figures 3-1 and 3-2 provide the gaps associated with the fuel racks.

b) Clarify whether there is any gap between the four racks in the new fuel pit;

No fuel racks will be located in the new fuel vault.

c) Identify the gap tolerances for each of the gaps between the fuel to cell wall, rack to rack, rack to equipment area, and rack to wall;

Construction tolerances were not considered in the rack evaluation. Dimensions were based on nominal dimensions. Because the racks are pinned together, the gaps between racks will remain consistent during installation.

d) Explain whether any studies were done for different initial gap conditions considering the potential tolerances, and if not, explain why;

The racks that are close together are connected thus the tolerances on the gaps are not significant (as compared to when they are free-standing). The rack group separation and the rack to wall separations are significant. However, the gaps are large (> 11.43"); thus potential construction and manufacturing tolerances are not considered to be relevant. The spent fuel rack seismic non-linear time history analyses use nominal dimensions and gap conditions.

e) Explain whether there are any requirements to ensure that the assumed gaps (considering tolerances) will be maintained throughout the licensing period, in particular following a seismic event.

The racks that are close together are connected. Seismic analyses demonstrate the structural integrity of the racks and connecting hardware. Thus, gaps between racks are maintained following a seismic event. After a seismic event, there would be a walkdown and review of

the plant, and any movement that may be noted would be reviewed for operability. This assessment is normal practice and not a special requirement.

c. Table 3-3 of WCAP-17331-P Revision 2 summarizes the material type and description of each component of the spent fuel rack.

d. As previously stated in this response, no racks will be located in the new fuel vault. All racks for new and spent fuel will be permanently located in the Spent Fuel Storage Pool.

e. As previously stated in this response, no racks will be located in the new fuel vault. For the spent fuel racks, Figure 3-3 of WCAP-17331-P Revision 1 was incomplete and did not show the tie bar that links adjacent cells, nor did the enlarged detail show the thickness of the wrapper plate. The upper and lower support bands are shown in WCAP-17331-P, Revision 2, Figure 3-3. The enlarged detail showing the wrapper plate is provided in WCAP-17331-P Revision 2, Figure 3-4.

f. As stated above, no racks will be located in the new fuel vault. The new fuel will be stored in the Spent Fuel Storage Pool in spent fuel storage racks (SFSR).

g. There are a total of eight (8) support feet (leveling pads) on each 10x10 spent fuel storage rack. WCAP-17331-P Revision 2, Figure A-13 illustrates the location of each support foot.

h. The figures included in Appendix A of WCAP-17331-P, Revision 2 (Sketches A-4, A-6, and A-7) show that some of the of the exterior cells of the fuel racks are only covered by neutron absorbing material on three sides because the fourth side is covered by neutron absorbing material located on a cell from a neighboring rack. Neutron absorbing material is not required on the fourth side of a cell if it is located on an adjacent cell in the next rack. Likewise, corner cells as shown in Sketches A-5 and A-9 may have neutron absorbing material on two sides when the adjoining cells from the two neighboring racks have neutron absorbing material. For the cells located on the outside perimeter of a group of racks, the outside face of all exterior cells will be covered by neutron absorbing material.

   In Supplemental RAI 09.01.02-11 (No. 6070, Revision 6) to RAI 09.01.02-2 part (h), the staff requests that the applicant provide the following information to assist in completing its technical review:

   1. One of the follow-up questions for part (a) requests that the applicant address whether all the adjacent racks are tied together, specifically those that are separated by the 11.77" gap. The staff also requests that the applicant identify whether the racks on both sides of this gap are considered perimeter racks, requiring neutron absorbing material on the outside facing side of all exterior cells.

   2. The staff requests a clarification whether integrity of the neutron absorbing materials is also evaluated for seismic loading. If yes, explain how this evaluation is performed. If no, explain why it is not necessary.

Response to 1:

In the STP 3 & 4 rack layout detailed in WCAP-17331-P Revision 2, Figure 3-2, the racks are pinned together to form two separate groups of racks. There is a group located in the eastern end of the pool, and a group in the western end of the pool. The two groups are separated by an 11.77 inch gap and are not connected together. They are free to slide in the spent fuel pool independently during a seismic event. The cells adjacent to this gap are considered perimeter cells and require a neutron absorber on the outside face of each cell.

Response to 2:

The neutron absorber provided for criticality control is a commercial composite plate consisting of a core of mixed aluminum and boron carbide (B_4C) particles encased in aluminum cladding. The layers of cladding are solid aluminum. The aluminum and boron carbide that make up the central core are combined in a finely divided powder before hot rolling. This plate is held in place by a wrapper that is separately welded to the SFSR structural elements. The neutron absorber wrapper plate is not a structural member. Its primary function is to hold the neutron absorber plate within the cell. To achieve this function, the welds between the wrapper plate and the cell wall must withstand the fuel impact loads. The fuel impact load is compressive on the wrapper plate; however, the wrapper plate spot welds are conservatively assumed to take the full impact load as a tensile load. The wrapper plate is attached to the cell wall by 84, 0.10 inch diameter spot welds. The resulting maximum weld stress is 4.13 ksi, which is less than the allowable weld stress of 29.6 ksi; refer to WCAP-17331-P, Revision 2, Section 8.2.4. Details of the stress evaluation are provided in WCAP-17331-P Revision 2, Reference 3.

i. The weld details for all connections are provided in the sketches contained in WCAP-17331-P, Revision 2, Appendix A (Sketch A-3, A-5, A-6, A-7, A-9, A-10, A-11 and A-13).

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

RAI 09.01.02-3

QUESTION:

Summary: Provide additional information on loads and load combinations.

Table 4-1 of both Technical Reports (Rev. 1) lists the loads and load combinations to be used for the structural design of the fuel storage racks. 10 CFR Part 50, Appendix A, GDC 2 requires that the design bases for SSCs important to safety shall reflect appropriate combinations of the effects of normal and accident conditions with the effects of the natural phenomena. The load combinations listed in the reports are consistent with those given in Table 1 of Appendix D to SRP 3.8.4. However, additional information is needed for the staff to conclude that all of the appropriate loads and load combinations have been considered for the new and spent fuel configuration as described in the Technical Reports. Therefore, the applicant is requested to provide the following information and update appropriate sections of the new and/or spent fuel racks technical reports as necessary.

a. Provide a breakdown of forces and stresses for each individual load in each load combination, so that the staff can determine whether all applicable load combinations have been appropriately evaluated.

b. Provide values for To and Ta. According to Appendix D to SRP 3.8.4, for the load combination with SSE, the temperature Ta, which is defined as the highest temperature associated with the postulated abnormal design conditions, should be assumed. Explain why material properties at 140 °F were used for the spent fuel rack design evaluation for the load combination with SSE.

c. Table 1 of Appendix D to SRP 3.8.4 identifies that a stuck fuel assembly load case be checked. However, the Technical Reports (Rev. 1) state that a stuck fuel assembly load case does not need to be considered, and reference the COLA Part 2, Tier 2, Section 9.1, (Rev. 4) statement that "the loads experienced under a stuck fuel assembly condition are typically less than those calculated for the seismic conditions." The statement does not provide sufficient technical basis for not considering the stuck fuel assembly load case. Provide analysis detail for the stuck fuel assembly load case and the technical basis for the maximum stuck fuel load that will be used in the analysis.

REVISED RESPONSE:

NINA provided responses to RAI 09.01.02-3 items b. and c. on June 23, 2011, in letter U7-C-NINA-110084 (ML11178A073). Preliminary comments and requests for clarification were received and discussed on July 13 and July 20, 2011. This revision incorporates those clarifications and the response to item a. As noted in RAI 09.01.02-2, STD DEP 9.1-1 was revised and submitted separately along with a new Tier 1 departure to remove the New Fuel Storage Racks from the New Fuel Vault on July 19, 2011 in letter U7-C-NINA-NRC-110098 (ML11202A268).

This response also addresses the supplemental RAI 09.01.02-12 (No.6070 Revision 6) to RAI 09.01.02-3 part (c).

This response revision supersedes the previous response in its entirety.

a. The load combinations addressed in the analysis are listed in WCAP-17331-P, Revision 2, Table 4-7. The operational basis earthquake (OBE) is not a design requirement for STP 3&4. WCAP-17331-P, Revision 2, Section 4.3.3 shows that the Level A to Level D allowable ratio is many times greater than the load ratio, therefore, Level A loads are insignificant and Level A stresses are not reported.

   The stresses and load case combinations evaluated in WCAP-17331-P, Revision 2 are Level B: D+L+To +P_f; and Level D: D+L+To+E'.

   The Level B forces and stress evaluation are provided in WCAP Section 8.4.

   The Level D forces and stress evaluation are provided in WCAP Sections 8.1 and 8.2.

b. Section 9.1.2.1.5 of the DCD defines a maximum operating temperature of 66°C [To = 150.8°F], and Section 9.1.2.1.4 of the DCD establishes the upper design limit for the water temperature as 100°C [an abnormal temperature of Ta = 212°F]. The maximum temperature differential associated with the postulated abnormal design conditions is 10°F. WCAP-17331-P, Revision 2 conservatively uses material properties and allowable limits evaluated at 212 °F for all service conditions.

c. A stuck fuel assembly evaluation is included in WCAP-17331-P Revision 2, Section 8.4. WCAP Subsection 8.4.3 includes discussion of the three items contained in RAI 09.01.02-12; base metal shear allowable, consideration of local loads, and consideration of buckling.

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

RAI 09.01.02-4

QUESTION:

Summary: Provide additional information on fuel drop analyses.

10 CFR Part 50, Appendix A, GDC 1, requires that SSCs important to safety be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed In addition, Section I.4 of SRP 3.8.4, Appendix D, specifies that the fuel pool racks and the fuel pool structure should be evaluated for accident load combinations. Section 8.3 of both Technical Reports addresses fuel drop analysis. However, the staff finds that there is insufficient information for the staff to complete its review in accordance with SRP 3.8.4, Appendix D. Therefore the staff requests the applicant to provide the following additional information, and to update Section 8.3 of the technical reports, as appropriate:

a. For the fuel drop load case, provide details of design checks on baseplate, support plate, as specified in Section I.4 of SRP 3.8.4, Appendix D. Explain whether drop cases producing maximum bending stresses and/or maximum shear stresses in baseplate were considered, and describe the impact locations assumed in the drop cases.

b. Describe the material stress-strain curves used, and identify whether they are "engineering stress-strain" curves or "true stress-strain" curves. Also describe how the curves were adjusted for the ambient temperature. Provide references for the curves used.

c. Explain whether sensitivity studies were performed to confirm the adequacy of the mesh in the finite element model. If no sensitivity studies were performed, provide the technical basis for concluding that the analyzed mesh is sufficiently refined to obtain an accurate solution.

d. Describe how the dropped fuel assembly was modeled. Is it assumed to be infinitely rigid, absorbing no energy by deformation, or is it assumed to be an elastic-plastic member, capable of absorbing energy by deformation? If the latter is assumed, provide figures showing the fuel assembly deformation for both the shallow and deep drop cases, and specify the percent of the initial potential energy that is absorbed by deformation of the fuel assembly.

e. Provide figures showing the deformation shape of cell wall for the controlling shallow drop case and the deformation shape of the baseplate for the controlling deep drop case. Discuss whether baseplate deformation leads to loss of boral shielding of the active fuel zone, and whether this needs to be considered in criticality analysis.

REVISED RESPONSE:

This response revises the original response submitted on August 1, 2011 in letter U7-C-NINA-NRC-110105 (ML11216A224). Preliminary comments and requests for clarification were received and discussed with the NRC on August 24, 2011. This revision incorporates those comments and clarifications. As noted in RAI 09.01.02-2, STD DEP 9.1-1 was revised and submitted separately along with a new Tier 1 departure to remove the New Fuel Storage Racks from the New Fuel Vault on July 19, 2011 in letter U7-C-NINA-NRC-110098 (ML11202A268). This revision supersedes the previous response in its entirety.

a. Section 8.3 of WCAP-17331-P Revision 2, has been updated to include the details requested concerning the impact loading conditions considered in the fuel drop analysis, including checks of the baseplate and support plates. The criteria of SRP 3.8.4, Appendix D, Section I.4 is discussed in Subsection 8.3.3. Several drop cases and impact locations intended to produce maximum bending and shear stresses in the baseplate and support plates have been considered. Additional fuel impact locations beyond those presented in the original RAI response are depicted in WCAP Figure 8-4. Shallow drop locations are identified as cases 1 through 7 and the deep drop cases are identified as cases a through c.

   Refer to the response to RAI 09.01.02-13 regarding supplemental questions pertaining to the fuel drop analysis.

b. Refer to WCAP-17331-P Revision 2, Subsections 8.3.3 part 2 and 8.3.4 for discussion of the rack material model/stress strain curve used in the fuel drop analysis (Figure 5 from the original RAI response has been incorporated in the WCAP as Figure 8-6). The curves come from a report presented at the Proceedings of PVP2007, ASME Pressure Vessels and Piping Division Conference, July 20-26, 2007, San Antonio, Texas, and the documentation is contained in the calculation notes cited in the WCAP.

c. A mesh sensitivity study was performed to ensure the stability of the mesh. The target element size was varied between edge lengths of 3, 2, and 1 inches (approximately 2, 3, and 6 elements per cell width, respectively). A typical load case analysis was performed and the sets of results compared. The 2-inch and 1-inch element size models yielded results with negligible differences in total deformation at the top of the rack and forces at the bottom of the support pads. The 1-inch element size was chosen for added assurance and because solution efficiency was not significantly compromised by the higher fidelity mesh.

d. The fuel assembly is modeled as an effectively rigid body. That is, the fuel is represented as a meshed, deformable body; however, its elastic modulus has been set an order of magnitude higher than the elastic modulus of the impacted material, i.e., the rack cell walls and baseplate. Figure 1 shows a plot of the total internal energy of the system versus the energy absorbed by the fuel due to deformation for a deep drop case. The plot confirms that an insignificant (less than 1%) amount of energy is absorbed by the fuel model during impact.

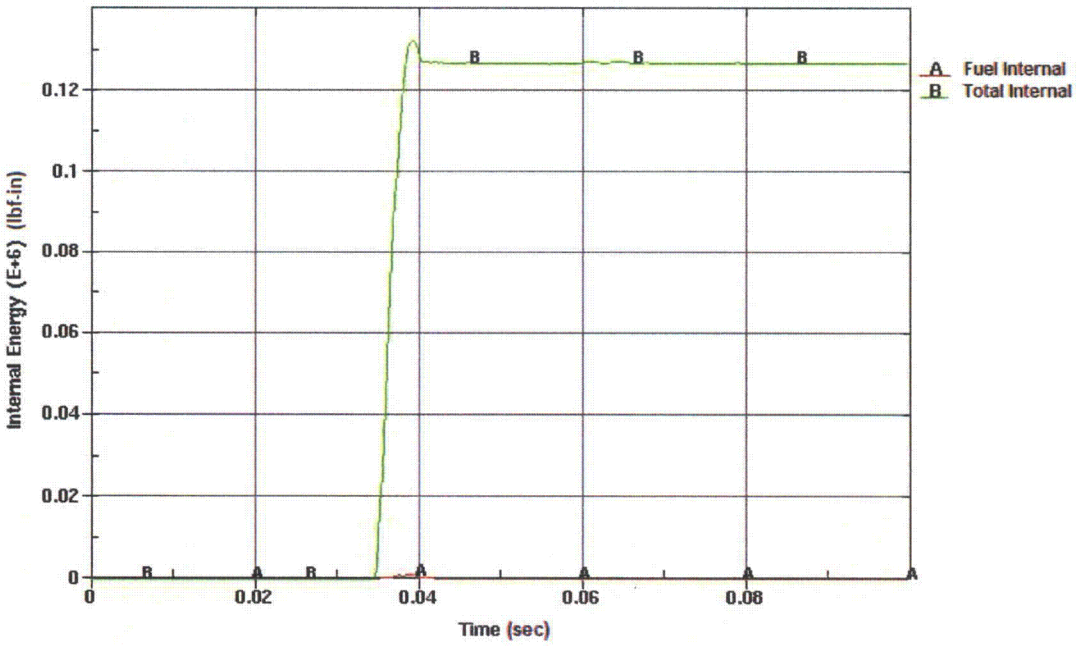

Figure 1: Total Internal Energy vs Energy Absorbed by Fuel

e. Refer to WCAP-17331-P Revision 2, Section 8.3.5 for discussion of rack deformation results and Figures 8-7 and 8-8 for plots relative to the neutron shielding for the fuel drop analysis.

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

RAI 09.01.02-5

QUESTION:

Summary: Provide more information on modeling and analysis.

10 CFR 50, Appendix A, GDC 2, requires that safety-related structures be designed to withstand the most severe natural phenomena, such as earthquakes. Acceptable methods for performing seismic analysis of fuel racks are described in SRP 3.8.4, Appendix D. Section 4.2 of both Technical Reports addresses modeling of the fuel storage racks for seismic analysis. The staff finds that the information provided is insufficient to conduct its review of the applicant's seismic analyses in accordance with SRP 3.8.4, Appendix D. Therefore, the staff requests the applicant to provide the following additional information on modeling, and to update Section 4.2 of the technical reports, as appropriate:

a. Section 4.2.2 of the new fuel rack Technical Report states that the bottom of the fuel is also coupled vertically to the baseplate. However, Figure 4-2 (entitled Fuel-to-Cell Connection) of the report does not show the coupling connection between the bottom of the fuel and the baseplate. Provide the physical details of the coupling and explain how this connection was modeled.

b. Explain the darker horizontal line patterns shown in the ANSYS Fuel Rack Model Isometric View of Figure 4-1 of the new fuel Technical Report and Figure 4-6 of the spent fuel Technical Report. Clarify whether they denote a finer element mesh and if so, explain the need for a finer element mesh at those locations.

c. Section 4.2 of the spent fuel rack Technical Report describes the contact elements. Explain whether the contact elements incorporate any impact stiffness. If yes, provide the impact stiffness values for the fuel-to-cell wall contact and the rack-to-floor contact, and explain how those values were determined. Was any sensitivity analysis for impact stiffness performed?

d. Figure 4-7 of the spent fuel rack Technical Report shows that pipe elements were used in the modeling of fuel-to-cell connections. Explain the purpose of those pipe elements. Are they rigid or flexible?

e. Section 4.2 of the spent fuel rack Technical Report describes the modeling of fluid-structure interaction. Explain whether water above and below the racks was also considered in the model. Describe the differences in the hydrodynamic coupling for fuel assembly to cell wall, rack to rack, and rack to pool wall. Describe and justify the assumptions made in the modeling of fluid-structural interaction.

f. Section 4.2 of the spent fuel rack Technical Report indicates that nonlinear time history SSE analysis was performed. Explain what sensitivity studies (e.g., double precision vs. single

precision; varying the solution time step; etc.) were conducted to ensure solution convergence and the adequacy of the predicted results.

g. For the modeling of fuel assemblies for both the new and spent fuel rack analyses, explain how the stiffness and damping of the fuel assemblies were determined and provide the corresponding values used.

h. For both the new and spent fuel rack analyses, provide information on the modeling of support legs; for example, the vertical stiffness of the level screw in a support leg and the element type used for the level screw.

i. Section 3 of the spent fuel rack Technical Report states that each spent fuel rack is attached to the neighboring spent fuel rack with tie-bars at the top of the racks, and each side of a rack has a tie-bar. Provide information on the modeling of side-bars. Since Figure 4-9 seems to show more tie-bars at each side of a rack, explain the apparent inconsistency between the statement in Section 3 and Figure 4-9. In addition, since the racks will only be tied together at the top of racks, explain whether any impact between racks at the baseplate level was considered in the modeling and analysis. If not, explain why not.

j. The friction coefficient between the support plate and the pool liner is an important factor affecting the seismic response of the spent fuel racks. Based on its review of prior fuel rack analyses, the staff has concluded that the worst stress condition for all structural elements may not necessarily be associated with one of the bounding values. Provide the technical basis for only considering the two bounding values (0.2 and 0.8) and not other intermediate values.

k. The staff requires clarification of apparent inconsistencies between the technical reports and the FSAR. Section 4.2.3 of both Technical Reports indicates that all three directions of motion are applied simultaneously to the fuel rack models for both the new and spent fuel rack seismic analyses. FSAR Subsections 9.1.1.1.3 and 9.1.2.1.3 indicate that the loads in the three orthogonal directions are combined using the square root of the sum of the squares (SRSS) method. The staff notes that in equivalent static seismic analysis, the method used for new fuel racks, the three directions of motion normally are applied separately so that the response due to each direction of motion can be obtained, and then combined with the responses due to other directions of motions by a combination rule such as SRSS. In time history seismic analysis, the method used for spent fuel racks, the three directions of motion normally are applied simultaneously in a single analysis and the combination of the responses due to the three directions of loading is automatically algebraic. Therefore, clearly describe for both the new fuel racks and for the spent fuel racks, how the three directions of motion are applied, and how the responses due to the three directions of motions are combined.

l. The fabrication of fuel racks relies heavily on the use of intermittent welds, primarily fillet welds. Load transfer between members relies on the adequacy of the welds to transmit the

loads. Accurate stress evaluation of the welds is critical in establishing the seismic adequacy of the fuel rack design. There is no information on modeling of welds in the Technical Reports. Provide details on the modeling of welds at all critical locations, in both the new fuel rack and spent fuel rack Technical Reports.

m. Section 4.2.1 of spent fuel rack Technical Report describes detailed rack models and simplified rack models. Describe the benchmarking of simplified rack models using the detailed rack models. For example, compare the major structural frequencies between two models. Explain whether the locations of detailed vs. simplified rack models were varied, and a series of Whole Pool Model (WPM) analyses were performed. If not, provide the technical basis for determining the location representing the worst case scenarios.

n. For both new and spent fuel rack analyses, discuss whether various fuel loading pattern scenarios are considered; i.e., different fill ratios, from partially full to full within a given rack; varying fuel locations within the partially filled rack; varying fill and locations in adjacent racks. Would it ever be possible to have less than all fuel racks in the pool?

o. Section 6 of both the new and spent fuel rack Technical Reports describes computer codes used in the analyses. Explain whether the validation documents for these computer codes are in compliance with SRP 3.8.1, Subsection II.4.E.

REVISED RESPONSE:

NINA provided responses to RAI 09.01.02-5 items a, b, d, e, f, h, j(partial), k, l, and o on June 23, 2011, in letter U7-C-NINA-NRC-110084 (ML11178A073). Preliminary comments and requests for clarification were received and discussed with the NRC on July 13 and July 20, 2011.

This revised response incorporates those comments and clarifications and provides response to the remaining items c, g, i, j, m, and n.

The response also addresses supplemental RAI 09.01.02-14 (No. 6070 Revision 6) to RAI 09.01.02-5 parts (d) and (e).

This revised response supersedes the previous response in its entirety.

a. Refer to response to RAI 09.01.02-2. As stated in the first part of that response, no racks will be located in the New Fuel Vault.

b. The original figure referred to has been replaced by WCAP-17331-P, Revision 2, Figure 4-10. An explanation of this figure is provided in Section 4.2.2.1 of the WCAP. The figure shows the 4x12-inch weld connection between adjacent cells. Results presented in WCAP-17331-P, Revision 2, are based on this weld pattern.

c. The contact elements between the (1) fuel-to-cell wall and (2) rack-to-floor do incorporate impact stiffness.
(1) Fuel-to-cell wall impact stiffness: The contact spring elements represent the fuel through-grid structure impact stiffness (TGSIS). The DCD TGSIS information is derived from a range of impact stiffness based on pressurized water reactor fuel: [ ]^{a,c} Analyses are completed to confirm that the rack's dynamic response is not sensitive to the magnitude of the impact stiffness. The sensitivity study shows that the [ ]^{a,c} range in impact stiffness results in a percent difference of the first mode frequency of 0.32% and is not considered significant. Additional sensitivity studies were completed: The seismic time history input is applied to a single rack model. Three runs are made: one with the baseline impact stiffness of [ ]^{a,c}, one with [ ]^{a,c} impact stiffness, and one with [ ]^{a,c} impact stiffness. The results show that there is less than 2% variation in the fuel impact load due to a [ ]^{a,c} variation in fuel grid impact stiffness. Therefore, to maximize fuel impact loads, a TGSIS value of [ ]^{a,c} is used.
(2) Rack-to-floor impact stiffness: The vertical impact stiffness represents the spring constant of the concrete slab. A value of [ ]^{a,c} is used in this analysis. This value is typical for a concrete under pressure load applied over a rectangular area.

d. This revised RAI response includes the response to supplemental RAI 09.01.02-14 (6070, Revision 6) item (d).

[

]^{a,c}

e. This revised RAI response includes the response to supplemental RAI 09.01.02-14 (6070, Revision 6) item (e)

Rack-to-Rack: The hydrodynamic mass between the racks is calculated from analyses performed using the [

]a,c The hydrodynamic mass matrix couples facing peripheral nodes on adjacent racks. WCAP-17331-P, Revision 2, Section 4.2.3.2.1 provides details of the rack-to-rack hydrodynamic coupling evaluation.

Fuel-to-Cell Wall: The fuel element-to-cell wall fluid interaction is based on a fluid-structure analysis of the geometry shown in WCAP-17331-P, Revision 2, Figure 4-20. [

]a,c WCAP-17331-P, Revision 2, Section 4.2.3.2.3 provides additional detail on fuel-to-cell wall hydrodynamic coupling.

Rack-to-Pool Wall: The hydrodynamic mass between the rack and pool wall is calculated from separate analyses performed using the [

]a,c WCAP-17331-P, Revision 2, Section 4.2.3.2.1 provides additional detail on rack-to-pool wall hydrodynamic coupling.

[

]a,c

Verification: The fluid structure interaction methodology uses the theory from Fritz, WCAP-17331-P, Revision 2, Reference 9, Fritz, R.J., "The Effect of Liquids on the Dynamic Motions of Immersed Solids," Transactions of the ASME, 1972, and the ANSYS fluid elements. Verification is accomplished by applying the methodology to a test case of a cylinder within a cylinder (WCAP-17331-P, Revision 2, Figure 4-19). The results are shown in WCAP-17331-P, Revision 2, Table 4-2, with very good correlation between the test case and the theory. R_o is the outer cylinder radius and R_i is the inner cylinder radius. Comparing WCAP-17331-P, Revision 2, Table 4-2 to Equations 14 and 15 in Fritz (WCAP-17331-P, Revision 2, Reference 9), M_{11} is the term M_H, M_{12} or M_{21} is the term $(M_1 + M_H)$, and M_{22} is the term $(M_1 + M_2 + M_H)$. The calculated hydrodynamic mass matrix is directly input to the

rack structural model using ANSYS MATRIX27 elements. The ANSYS MATRIX27 element allows specification of both on and off diagonal mass values.

f. The accuracy of the transient dynamic solution depends on the integration time step. A time step that is too large will affect higher mode responses. Too small a time step will significantly increase ANSYS run times. ANSYS provides guidelines for selecting an integration time step. ANSYS suggests that 20 or more points per cycle for the highest frequency of interest be used. ANSYS also suggests use of at least seven points per cycle for contact frequencies (such as the fuel rattling) to minimize energy loss. Using rack, fuel, and gap stiffness properties similar to the STP SFR yields a required time step of 0.002 seconds. The STP SFR time history analysis uses a time step of 0.001 seconds and allows for a bi-section down to 0.0001 seconds. Because the time step used satisfies the ANSYS criteria for minimum integration time step size, no additional sensitivity studies were performed.

g. A FEM representative of the DCD fuel assemblies is developed. The model utilizes simple beam and mass elements to represent the geometry and behavior of an actual fuel assembly. The stiffness of the fuel assembly is based on a detailed model of a BWR fuel assembly. The detailed model was simplified for use in the whole pool model (WPM) seismic analysis and modified to match the characteristics of the DCD fuel. A modal analysis of the fuel FEM is performed and the results are evaluated against in-water fundamental natural frequency data derived from lateral vibration tests. [

]^{a,c}

h. The support legs (leveling screw, material ASTM A564, Grade 630) are modeled using the 3-D beam ANSYS BEAM4 element. WCAP-17331-P, Revision 2, Figure 4-8 shows how the leveling screw is connected to the support plate. The vertical stiffness of the leveling screw is determined from its cross sectional area, length, and material properties. The contact and friction between the leveling screw and the spent fuel pool floor is modeled using ANSYS CONTAC52 elements. WCAP-17331-P, Revision 2, Section 4.2.2.1 provides additional details of the leveling screw model including cross sectional area, length, and material properties.

i. In the spent fuel storage pool, the racks are connected together using an interlocking lug and clevis system. This assembly is referred to in WCAP-17331-P Revision 2 as the linkage assembly. The linkage assembly consists of a reinforcement band that is welded to the outer perimeter of the grid structure. [

]^{a,c}

There is an upper and a lower linkage assembly on each rack. The linkage assembly geometry is shown in WCAP-17331-P, Revision 2, Sketch A-9. The linkage assembly reinforcement band is welded continuously along its perimeter to the grid structure. The FEM coupled node representation of this weld is shown in WCAP-17331-P, Revision 2, Figure 4-14.

The linkage assembly geometry is different from the geometry shown in WCAP-17331-P, Revision 2, Figure 4-9. The FEM lug and clevis geometry is used only as a stiffness representation, and is therefore a good approximation of the geometry in WCAP-17331-P, Revision 2, Sketch A-9. The stress calculations use the correct geometry from Sketch A-9 and the load outputs from the FEM stiffness representation. Details of the linkage stress evaluation are provided in WCAP-17331-P, Revision 2, Reference 3.

j. The SFR seismic analyses are completed for bounding friction coefficients, 0.2 and 0.8, and an intermediate coefficient of friction, 0.5. Seismic analysis results for all three friction coefficients are provided in WCAP-17331-P, Revision 1.

k. The SFR seismic time history analysis applied the three directions of motion simultaneously in a single analysis. As a result of this analysis approach, the combination of the responses from the three orthogonal directions of loading is an algebraic summation. Consistent with the guidance of Regulatory Guide 1.92, and as described in the response to RAI 09.01.02-9 (a) Rev. 1, the time histories for the analysis are statistically independent.

COLA Part 2, Tier 2, Subsection 9.1.2.1.3 will be revised as noted below.

l. The grid structure is built from long, rectangular sheet metal cells and coverplates that are welded together as shown in figures referenced in response to RAI 09.01.02-2. Modeling of the welds in ANSYS is as shown in WCAP-17331-P, Revision 2, Figures 4-10 and 4-11. The grid structure is coupled to the baseplate, as shown in WCAP, Figure 4-12. The support plates are welded along its edges to the baseplate as shown in WCAP, Figure 4-13. All welds are modeled using the ANSYS CP coupling command. The SFR weld joints are evaluated by obtaining the loads and moments on the weld joint couples and dividing the maximum calculated weld load by the weld throat area. Details of the weld modeling and weld stress evaluations are provided in WCAP-17331-P, Revision 2, Reference 3.

m. Validation of the simplified rack model to the detailed rack model based on comparison of the rack's first mode structural frequency is provided in WCAP-17331-P, Revision 2, Section 4.2.2.2.

A simplified WPM is analyzed to determine the racks with the greatest impact loads. [ ]^{a,c} The racks determined to have the greatest impact loads from the simplified WPM are modeled in the detailed WPM by including the detailed fuel model. WCAP-17331-P, Revision 2, Section 4.2.3.2.5 provides additional details.

n. A partially loaded WPM is considered. WCAP-17331-P, Revision 2, Section 4.2.3.2.6 provides the basis for selecting a loading pattern for the partially loaded WPM seismic analysis.

The spent fuel pool rack design is developed for all racks in the pool. It is not anticipated that any rack(s) would need to be removed as they are designed for normal, off-normal, and accident events. Should it ever be necessary to remove a rack, this activity would be subject to the normal plant design change and operability evaluation processes.

o. The validation process for computer programs listed in Section 6 of WCAP-17331-P, Revision 2 complies with the criteria contained in SRP 3.8.1 Subsection II.4.F, "Computer Programs." (Although SRP 3.8.4 Subsection II.4. D. refers to SRP 3.8.1 Subsection II.4.E, it appears that II.4.F is the correct reference.) In addition, the computer program verification and validation process complies with the Westinghouse Quality Program. The specific sections applicable to ANSYS, which is external software acquired from an approved vendor, are Section NSNP 3.6.5, "External Computer Software," and 3.6.2, "Validation of Computer Software." The Westinghouse Quality Program meets customer and regulatory requirements and has been reviewed and approved by the NRC.

As a result of this RAI response, the 10th paragraph in COLA Part 2, Tier 2, Subsection 9.1.2.1.3 will be revised. Changes from COLA Rev. 6 are indicated with grey shading as follows:

9.1.2.1.3 Mechanical and Structural Design

The loads in the three orthogonal directions are considered to be acting simultaneously in a single analysis and are combined ~~using the SRSS method suggested~~ in accordance with Regulatory Guide 1.92.

RAI 09.01.02-6

QUESTION:

Summary: Provide more information on design checks.

10 CFR 50, Appendix A, GDC 1, requires that SSCs important to safety be designed to quality standards commensurate with the importance of the safety functions to be performed. Section I.4 of SRP 3.8.4, Appendix D, identifies that the applicant should demonstrate that the functional capability and/or the structural integrity of each component is maintained. Also, as indicated in Section I.3 of SRP 3.8.4, Appendix D, loads generated by the impact of fuel assemblies during a postulated seismic excitation should be considered for local as well as overall effects, and it should be demonstrated that the consequent loads on the fuel assembly do not lead to damage of the fuel. Although the new and spent fuel racks Technical Reports present some analysis and design information, the staff finds that it is insufficient to conduct its review in accordance with SRP 3.8.4, Appendix D. Therefore, the staff requests the applicant to provide the following additional information, and to include this information in the new and spent fuel racks technical reports, as appropriate.

a. In Section 8.2.2 of the new fuel rack Technical Report, a factor of 0.707 is considered in the calculations for allowable weld stresses. The 0.707 factor is not considered in similar calculations presented in Section 8.2.3 of the spent fuel rack Technical Report. In addition, expand the information in the technical reports to include the code evaluation for all welds.

b. Section 8 of the spent fuel rack Technical Report provides selected results of the seismic analyses. Provide additional seismic analysis results for the spent fuel racks, to include maximum acceleration, maximum rocking angle of a rack, maximum uplift height of a rack support plate, maximum impact force between racks (if any), and maximum impact force on the concrete floor.

c. Section 8.2.1 and 8.2.5 of the spent fuel rack Technical Report indicate that, for the fuel rack cell wall and support plate, respectively, the membrane plus bending stresses exceed the corresponding ASME Code stress limits. The applicant's basis for the acceptability of these exceedances is provided in Note 1 of Table 8-1, Section 8.2.5, and repeated in Notes 1 and 2 of Table 9-1, and identifies that (1) the exceedances are local; (2) structural integrity of the cell wall will be maintained; and (3) the local peak stress in the support plate would redistribute. This is insufficient justification. Provide the ASME Code technical basis for the acceptance of the stress ratios of 1.8 and 1.04 shown in Table 8-1 and Table 9-1, with reference to specific applicable Code paragraphs.

d. Section 8.2.1 of the spent fuel rack Technical Report indicates that the critical buckling stress is 18.9 ksi in the fuel rack cell wall, for level A load combinations. Provide a description of the methodology for the calculation of the critical buckling stress. Was buckling analysis performed for fuel rack cell wall subject to level D load combinations, including seismic analysis and fuel drop analysis? If not, explain why not. If yes, provide a comparison of the

calculated compressive stress vs. the allowable compressive stress based on buckling, and the basis (e.g., code limit) for the allowable value.

e. Explain whether punching shear analysis was performed for the part of the baseplate above a support leg, subjected to maximum vertical load under seismic or fuel drop impact loads.

f. Section 8.1.1 "Fuel-to-Cell Wall Impact Loads" of the new fuel rack Technical Report states: "The most significant load on the fuel assembly arises from rattling during the seismic event. The magnitude of the fuel impact force is calculated by pinning both ends of the fuel beam model in the x, y, and z degrees of freedom." Explain the technical basis for pinning both ends of the fuel beam model. Are there lateral constraints at top and bottom?

REVISED RESPONSE:

NINA provided responses to RAI 09.01.02-6 items a. and f. on June 23, 2011, in letter U7-C-NINA-NRC-110084 (ML11178A073). Preliminary comments and requests for clarification were received and discussed with the NRC on July 13 and July 20, 2011. This revision incorporates those clarifications and the response to items b, c, d, and e.

The response also addresses the supplemental RAI 09.01.02-15 (No. 6070 Revision 6) to RAI 09.01.02-6, part (a):

This response supersedes the earlier response in its entirety.

a. Regarding the New Fuel Rack (NFR) Technical Report, WCAP-17311-P, please refer to response to RAI 09.01.02-2 Revision 1 regarding removal of the New Fuel Storage Racks from the New Fuel Vault. No racks will be located in the New Fuel Vault.

   The 0.707 factor for weld throat area evaluations is considered for all fillet weld stress evaluations. Weld stress evaluation results are provided in WCAP-17331-P, Revision 2, Sections 8.2.2, 8.2.3, 8.2.4, and 8.2.5. Weld stress analysis details are provided in WCAP-17331-P, Revision 2, Reference 3.

   The element mesh used to evaluate the cell-to-cell weld stresses is shown in WCAP-17331-P, Revision 2, Figure 4-10. The figure shows the coupled nodes representing the welds. The weld stresses are obtained by summing the forces and moments on the nodes representing the welds.

   The mesh density in the rack stiffness model is based on several factors:
   1. A global maximum edge length,
   2. Cut locations at 16 fuel elevations so that the rack and fuel can be connected,
   3. Cut locations for the rack-to-rack hydrodynamic mass connection,
   4. Cell-to-cell welds,
   5. Cut locations for the linkage band to rack weld.

In the previous revision, some of these cut locations were grouped at similar elevations, but not the exact same elevation. This resulted in a higher mesh density to accommodate all the connection points. In this revision, the cut locations have shifted slightly, resulting in a different mesh density pattern. The overall mesh density is controlled by the global maximum edge length and was chosen such that the structure stiffness is adequately represented.

The modeling of weld joints is shown in subsection 4.2.2.1 in WCAP-17331 Revision 2. Each weld joint consists of multiple coupled nodes. The forces and moments from these nodes are obtained from the detailed submodel analyses and hand calculations are performed to determine the weld structural integrity.

Weld stress is based on the force through the coupled node joint. This is not a function of the weld region mesh density. The overall structure mesh density captures the stiffness of the structure and the grids. Therefore, the loads are suitable for hand calculating weld stresses.

The baseplate to support plate welds are evaluated using the submodel analysis of the floor impact. The submodel is described in WCAP-17331-P, Revision 2, Section 4.2.4. Vertical and shear loads are applied to the level screw and loads (vertical and shear) are determined at the weld interface by analysis. There are no specific moments applied, except that the shear load applies a moment on the support plate based on the level screw length. This is included in the model. The weld stress evaluation results are provided in WCAP-17331-P, Revision 2, Sections 8.2.2 and 8.2.3. Details of the weld stress evaluation are provided in WCAP-17331-P, Revision 2, Reference 3.

b. Maximum impact forces and uplift are provided in WCAP-17331-P, Revision 2, Section 8.1. The linkages between racks prevent the racks from tipping therefore, maximum rocking angles are not reported. Maximum accelerations of the fuel assembly are reported in WCAP-17331-P, Revision 2, Subsection 8.1.2.1. Acceleration results are typically not reported in non-linear time history analyses. Therefore, other than the fuel assembly, maximum accelerations are not included in WCAP-17331-P, Revision 2.

c. Revised stress evaluations of the support plate and fuel rack cell wall are completed using sub-models (see WCAP-17331-P, Revision 2, Sections 4.2.4 and 4.2.5). All resulting stress ratios are less than 1.0 (see WCAP-17331-P, Revision 2, Sections 8.2.2, 8.2.3, and 8.2.4). Stress results are based on elastic stress analyses. Details of the stress evaluations are provided in WCAP-17331-P, Revision 2, Reference 3.

d. Refer to response to RAI 09.01.02-3 a. regarding Level A load combinations. A Level D buckling analysis is performed for the fuel rack cell wall. The comparison of the calculated compressive stress versus the allowable compressive stress based on buckling, is provided in WCAP-17331-P, Revision 2, Section 8.2.4. The basis for the allowable is provided in WCAP-17331-P, Revision 2, Table 8-7, Note (1).

e. A punching shear stress analysis is performed for the baseplate above the support feet due to the maximum seismic vertical impact force. Results of the punching shear stress evaluation

are provided in WCAP-17331-P, Revision 2, Section 8.2.3. Details of the punching shear stress evaluation are provided in WCAP-17331-P, Revision 2, Reference 3. The acceptance criteria for the fuel drop analysis are based on strain and deformation criteria. Therefore, a punching shear stress analysis is not performed for the fuel drop analysis.

f. As stated previously in this response, no racks will be located in the New Fuel Vault.

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

RAI 09.01.02-8

QUESTION:

Summary: Provide information regarding thermal stress evaluation for the spent fuel racks.

Section I.4 of SRP 3.8.4, Appendix D, indicates that the temperature gradient across the spent fuel rack structure that results from the differential heating effect between a full cell (with spent fuel) and an empty cell (no spent fuel) should be evaluated and incorporated in the design of the rack structure. Based on the staff's review, it does not appear that this thermal gradient has been addressed in the spent fuel rack Technical Report. Therefore, the staff requests the applicant to include the design-basis evaluation of the temperature gradient across the rack structure, that results from the differential heating effect between a full and an empty cell, in an appropriate section of the spent fuel rack Technical Report.

REVISED RESPONSE:

NINA provided a response to RAI 09.01.02-8 on June 23, 2011, in letter U7-C-NINA-NRC-110084 (ML11187A073). Preliminary comments and requests for clarification were received and discussed with the NRC on July 13, and July 20, 2011. This revision incorporates those comments and clarifications. Information that has been revised is noted with side bars.

The design-basis evaluation of the thermal gradient across the rack structure, that results from the differential heating effect between a full and an empty cell as indicated in SRP 3.8.4, Appendix D, Section I.4, is included in WCAP-17331-P, Revision 2, Section 8.5.

No change to the COLA is required by the response provided above.

RAI 09.01.02-10

QUESTION:

Spent Fuel Assembly Integrity

As indicated in Section I.3 of SRP 3.8.4, Appendix D, loads generated by the impact of fuel assemblies during a postulated seismic excitation should be considered for local as well as overall effects, and it should be demonstrated that the consequent loads on the fuel assembly do not lead to damage of the fuel. Section I.4 of SRP 3.8.4, Appendix D, specifies that the applicant demonstrate that the functional capability and/or the structural integrity of each component is maintained. Therefore, for a complete review of the structural analysis of the spent fuel storage racks, including the spent fuel assemblies, the staff requests that the applicant describe the technical basis for (1) establishing the functional capability and structural integrity of the spent fuel assemblies, and (2) ensuring no fuel damage, when subjected to impact loads resulting from the postulated seismic excitation of the spent fuel storage racks. Include this information in an appropriate section of the spent fuel racks technical report. The response should specifically address the following:

a. Describe how the seismic demand on the spent fuel assemblies was determined, including considering maximum impact force due to both in phase and out of phase movement of fuel assemblies during a seismic event.

b. Describe the methodology used to determine the maximum allowable impact force that spent fuel assemblies are capable of withstanding.

c. Define the acceptance criteria used for functional capability, structural integrity, and no fuel damage.

d. Describe how the effects of irradiation embrittlement of the fuel rods, at initial storage and long term, are considered in the evaluation.

e. Compare the calculated capacity to the calculated demand, to demonstrate that the spent fuel assemblies will maintain their integrity under seismic loading.

RESPONSE:

a. The seismic demand (i.e. impact load) on the spent fuel assemblies is determined using the approach described in Section 8.1.2 of WCAP-17331-P, Revision 2.

   The first approach is using the seismic time history analysis of the spent fuel rack, which is analyzed assuming the fuel moves in-phase to maximize the overall loading and

response of the racks. The maximum fuel impact load on the spent fuel rack structure is calculated to be 2,724 lb. [

]a,c

The second approach addresses the possibility of an out-of-phase fuel movement. It is noted that if the spent fuel rack were analyzed with the fuel in random phase (or with every other assembly being 180° out-of-phase), the overall rack response would be lower and the anticipated fuel impact load would therefore also be lower. Nonetheless, to conservatively address the out-of-phase possibility, the fuel impact force is developed using the kinetic energy method as described in SRP 3.8.4 Appendix D. As described in the WCAP report, the kinetic energy of the fuel assembly is calculated, and then the acceleration to create an equivalent strain energy in the fuel assembly is determined. The equivalent acceleration is calculated to be 4.03g. This value is based on all of the strain energy being absorbed by the fuel; therefore, it represents a bounding case for both in - phase and out-of-phase loading conditions. Using this approach, the fuel impact load is calculated to be 1,488 lb. [

]a,c

b. Fuel assembly designs are developed to satisfy the criteria of SRP 4.2 for fuel in the reactor, including the effects of seismic loads. For seismic loads, the criteria are no fuel fragmentation and no deformation that inhibits insertion of the control blades. Evaluation of the BWR fuel as documented in the ABWR DCD explicitly addresses the fuel channel as the limiting component for satisfying these criteria, and demonstrates that the fuel channel deflection due to seismic loads is less than the available space for the control blade. Further, the channeled fuel assembly is shown to have capacity significantly in excess of the actual loading, as provided in Table 19H-10 of the SSAR (which is incorporated by reference in the DCD). This table shows that the fuel can accommodate a median seismic load of 4.72 times the design basis seismic load in the core, and over 2 times the seismic design basis with a high confidence low probability of failure. The response spectral acceleration at the reactor core (per DCD Figure 3A-147, estimated for 4% damping) is 2.4g. Therefore, the channel can withstand a seismic load of over 4.8g. The other feature of the fuel that needs to be maintained to provide fuel integrity is the geometry of the fuel bundle inside the channel. Changes in geometry could affect k_{eff} (if fuel rods were to move relative to each other), and excessive deformation could restrict the flow of water through the fuel assembly that provides the removal of the decay heat. [

]Toshiba

c. SRP Section 3.8.4 Appendix D provides the minimum requirements and criteria for review of the spent fuel racks and associated structures. The only SRP review criterion for the spent fuel itself is provided in Section I.3, which states that it should be demonstrated that the consequent seismic impact loads on the fuel assembly do not lead to damage of the fuel. For purposes of this evaluation, damage is defined to mean no gross deformation of the fuel bundle that would reduce the ability for cooling of the fuel or affect the reactivity of the assembly. The evaluation of the fuel assembly components discussed above is consistent with this interpretation.

d. The effects of irradiation embrittlement are ignored, as recommended in SRP 4.2, Appendix A, Section III.1 (NUREG 0800): "unirradiated production grids at (or corrected to) operating temperature." The SRP continues with "While [the allowable crushing load] P(crit) will increase with irradiation, ductility will be reduced. The extra margin in P(crit) for irradiated grids is thus assumed to offset the unknown deformation behavior of irradiated grids beyond P(crit)." The testing of the grids as discussed above was done at room temperature. Because the spent fuel is stored in the spent fuel pool at temperatures significantly below boiling, which are then even more significantly below the operating temperature of the fuel (for which the fuel and channel are qualified in the DCD), there is no need for adjustment of the results for either irradiation or temperature.

e. As discussed in (a) above, [ ]a,c As described in (b), the capability of the fuel and channel is in excess of 4.8g. It is also noted that, in a spent fuel rack, the channel is continuously supported by the fuel rack cell wall during the impact. Load is transferred from the fuel to the channel wall, and then to the fuel rack cell wall. As such, the stresses in the channel structure will be much less than those in the channel when it is in the core (i.e. unsupported). Because the unsupported channel (in reactor) is shown to be acceptable for seismic loads in the DCD, and the acceleration loads on the fuel in the rack are less than the acceptable unsupported load, it will also be acceptable in the spent fuel rack.

[ ]a,c [ ]Toshiba [ ]a,c

Based on the loads and capacity of the spent fuel stored in the STP 3&4 spent fuel racks as described above, the spent fuel assemblies will maintain their integrity during a design

basis seismic event. Therefore, the fuel integrity related criterion of SRP 3.8.4 Appendix D Section I.3 is demonstrated.

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

Reference:

1. [ ]Toshiba

RAI 09.01.02-11

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-2, part (a) and part (h), the staff requests that the applicant provide the following information to assist the staff in completing its technical review:

a. The RAI response indicated that the spent fuel storage pool has been reconfigured; one single rack size will be utilized for all racks; descriptive information is provided in sketches included with the RAI response.

   Sketch 3 shows the spent fuel storage boundary. Clarify what the spent fuel storage boundary represents.

   Sketch 4 shows two groups of racks and a 11.77" gap between the two groups. Explain whether all adjacent racks are tied together. If yes, provide the linkage design details for two racks with an 11.77" gap. If not, what is the maximum horizontal differential movement between the two rack groups during a seismic event?

   Sketch 6 shows that the overall height of the rack is now 180.1", which was 198.1" according to the Technical Report, Rev.1. Explain whether the size and weight of fuel assembly also have been changed. If yes, provide the updated values.

   Sketch 13 shows conceptual rack-to-rack linkage at the top of racks. During conference calls, the applicant stated that the 1/2" plates will be welded to the rack on each cell. The 0.1" thick cover plates are welded to cell wall faces with an overlap, creating a 0.1" mismatch between the cell wall external surface and the cover plate external surface. The staff requests that the applicant explain how the 1/2" plates will be welded to both the cover plates and the cell walls.

h. The RAI response states that neutron absorbing material is not required on the fourth side if it will be located on the adjacent cell in the next rack. For racks located on the perimeter, the outside facing side of all exterior cells will be covered by neutron absorbing material.

   One of the follow-up questions for part (a) requests that the applicant address whether all the adjacent racks are tied together, specifically those that are separated by an 11.77" gap. The staff also requests that the applicant identify whether the racks on both sides of this gap are considered perimeter racks, requiring neutron absorbing material on the outside facing side of all exterior cells.

   The staff requests a clarification whether integrity of the neutron absorbing materials is also evaluated for seismic loading. If yes, explain how this evaluation is performed. If no, explain why it is not necessary.

RESPONSE:

Answers to the above questions are contained in the updated responses to RAI 09.01.02-2 (a) and (h).

RAI 09.01.02-12

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-3, part (c), the staff requests that the applicant provide the following information, to assist the staff in completing its technical review:

c. The RAI response provided a design check of spent fuel storage rack for the stuck fuel assembly load case.

   Normally welds are checked for both weld material and base metal, as was done for Level A in Section 8.2.3 of the Technical Report, Rev 1. Page 3 of the RAI response develops the allowable maximum weld stress for the weld material. Explain why an allowable maximum weld stress based on the base metal is not developed.

   Explain whether any design check has been performed for the local region of the rack cell wall, at the location where the 1 kip horizontal load is applied.

   Explain whether the potential for buckling of the cell wall in compression has been considered.

RESPONSE:

Answers to the above questions are contained in the updated response to RAI 09.01.02-3(c).

RAI 09.01.02-13

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-4, part (a), the staff requests that the applicant provide the following information, to assist the staff in completing its technical review:

The RAI response provides details of design checks on baseplate and support plate for the fuel drop load case.

The Spent Fuel Storage Racks Technical Report, Rev 1, states that the drop analysis considered a fuel assembly dropped through the air and loading a dry fuel rack. During a conference call, the applicant explained that the assumption of dropping through the air is no longer valid. Buoyancy and water drag effect on the dropped fuel assembly were considered. Considering that the impact energy would be reduced because of the water drag effect and buoyancy, the staff requests that the applicant explain why the maximum vertical deformation for the shallow drop increases from 6.05" reported in Rev. 1 of the Technical Report to 7.30" reported in this RAI response.

SRP 3.8.4 Appendix D specifies the load combination for drop analysis: $D + L + F_d$. During a conference call, the applicant explained that, for deep drop analysis, the weight of rack was considered, but not the weight of fuel assemblies, because the weight of a fuel assembly is only 600 lb, which is much smaller than the impact force, which is around 100 kips. Also, the impact is localized. However, the staff noted that the weight of 100 fuel assemblies for a 10 x 10 rack is 600 lb x 100 = 60 kips, which is the same order of magnitude as the impact force. Therefore, the staff requests that the applicant provide additional technical basis for not considering the weight of fuel assemblies in deep drop analyses, or analyze a case with the fuel weight included.

In Figure 4 of the RAI response, holes are shown penetrating the large support plates. However, no holes are shown for the small support plates. During a conference call, the applicant explains that the flow holes are not modeled because NINA thinks that the modeling of the holes will not affect the structure integrity. However, the staff notes that 50% of the small support plate area is removed by the holes and the edge distance for the 4 drain holes is less that 0.25". Therefore, the staff requests that the applicant provide further explanation for not modeling the flow holes. Also, explain the physical meaning of the effective plastic strain shown in Figure 4. A similar issue exists for the baseplate effective plastic strain shown in Figure 2, where added holes for water drainage are not modeled.

RESPONSE:

Rev. 1 of the Technical Report (WCAP-17331-P Revision 1) contained results based on the original rack design and finite element model. After the rack design was revised, the finite element model was also revised. The revised model incorporated changes in rack geometry,

material modeling and boundary conditions. Of primary significance, the material model was adjusted to allow for additional conservatism. This explains the increase in deformation for the shallow drop cases despite there being less kinetic energy available.

Refer to WCAP-17331-P Revision 2, Section 8.3.4 for a discussion of the live load with regard to the fuel drop analysis.

A separate, more detailed finite element model of the base plate and support plates was created that includes the small flow holes in the small support plates and base plate located directly above. Refer to WCAP-17331-P Revision 2, Section 8.3.5 and Figures 8-9 & 8-10 for the results of that evaluation.

RAI 09.01.02-14

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-5, parts (d) and (e), the staff requests that the applicant provide the following information, to assist the staff in completing its technical review:

d. The RAI response indicated that the pipe elements that were used in the modeling of the fuel-to-cell wall connection are rigid and mass-less; they connect the spring elements and the grid outer walls normal to the face of the wall; this system of connection distributes the fuel lateral loads throughout the grid structure, but does not over stiffen the rack; additional information is given in Figures 1 and 2 included with the RAI response. The RAI response addressed most of the staff's concerns; however, regarding Figure 1, the staff requests that the applicant explain whether the spring elements shown include gap elements, and whether all pipe elements are shown.

e. The RAI response indicated that the fluid-structure interaction methodology uses the theory from Fritz. Also, additional modeling details are provided in the RAI response for the hydrodynamic coupling of fuel assembly-to-cell wall, rack-to-rack and rack-to-pool wall.

   For the rack-to-rack and rack-to-pool wall cases, explain why the hydrodynamic mass matrix terms are calculated for each rack for three different sections and what the basis for the use of the 25%, 50% and 25 % ratio; also explain the 16:70:14 ratio;

   For the rack-to-pool wall case, what gaps are assumed? For the rack-to-rack case, what gaps are assumed? Is the 11.77" gap shown in Sketch 4 of the RAI response to RAI 09.01.02-2 considered?

   Explain how the hydrodynamic mass matrix is input to the rack structural model. For the rack-to-rack case, are the hydrodynamic masses added to the cell walls along the rack periphery? For the rack to rack case, are the hydrodynamic masses added to the cell walls along the periphery of the single continuous rack volume? For the fuel-to-cell wall case, are the hydrodynamic masses added to all the cell walls?

In Figure 5, what do the darker horizontal and vertical lines stand for?

RESPONSE:

Answers to the above questions are contained in the updated responses to RAI 09.01.02-5(d) and (e).

Figure 5 in the original RAI 09.01.02-5 response has been replaced by WCAP-17331-P, Revision 2, Figure 4-22. The "darker" lines shown on the isometric view represent the finer mesh used by ANSYS, which is easier seen in the plan view of Figure 4-22.

RAI 09.01.02-15

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-6, part (a), the staff requests that the applicant provide the following information, to assist the staff in completing its technical review:

The RAI response provided more information on design checks of cell-to-cell weld, coverplate weld, cell-to-baseplate weld and baseplate-to-support plate weld.

During a conference call, the applicant explained that the finer element mesh shown in Technical Report Revision 1 for cell-to-cell weld, will not be used for the cell-to cell-weld in the re-analysis. The staff requests that the applicant explain why there is no longer a need to use a finer element mesh for the cell-to-cell weld.

For the baseplate-to-support plate welds, the RAI response only discusses compression force. Have horizontal forces and bending moments been considered in the evaluation of these welds? If not, provide the technical basis for excluding them.

RESPONSE:

Answers to the above questions are contained in the updated response to RAI 09.01.02-6(a).

RAI 09.01.02-16

QUESTION:

As follow-up to the applicant's response to RAI 09.01.02-7, the staff requests that the applicant provide the following information, to assist the staff in completing its technical review:

(1) The RAI response indicates that the quality assurance requirements applied to the spent fuel racks are established by DCD Table 3.2-1 and the NINA QAPD, Part III, "Non-Safety-Related SSC Quality Control". Regarding quality assurance requirements, as noted in FSAR Section 9.1.2.1.3, the spent fuel racks are Seismic Category I, in accordance with RG 1.29. As such, all of the QA provisions of 10 CFR 50 Appendix B would appear to be applicable. The staff's review of NINA QAPD Rev.6 Part III, referenced by the RAI response, found that it contains relatively few requirements, compared to 10 CFR 50 Appendix B.

The first sentence of the NINA QAPD Rev.6 Part III states "Specific program controls are applied to nonsafety-related SCCs, for which 10 CFR 50, Appendix B is not applicable, ..." This statement is inconsistent with DCD Table 3.2-1 (which is also referenced by the RAI response). Note e of DCD Table 3.2-1 states "Elements of 10CFR50, Appendix B are generally applied,..." The statement in Note e of DCD Table 3.2-1 is accepted by the staff, according to the ABWR FSER. Therefore, the staff requests that the applicant explain what aspects of Appendix B are deemed to be not applicable to spent fuel storages racks, and the basis for this determination.

(2) The RAI response indicates that SRP 3.8.4 ISI requirements refer to 10 CFR50.65 and RG 1.160 (Maintenance Rule), and that the performance and monitoring of the racks will be evaluated at least every refueling cycle. With respect to ISI, only the condition of the neutron absorbing material is monitored.

Regarding ISI, the staff concurs that the regulatory requirements for periodic ISI of spent fuel storage racks originates from 10 CFR 50.65 "Maintenance Rule". RG 1.160 clarifies acceptable procedures for implementation of the Maintenance Rule, and includes special guidance for condition monitoring of structures. The staff requests that the applicant explain whether the guidance provided in RG 1.160 for structures will be implemented for spent fuel storage racks, and update the report as necessary.

RESPONSE:

(1)The applicability of 10CFR50, Appendix B quality assurance (QA) requirements to the spent fuel racks (SFRs) was addressed and resolved during the ABWR design certification under 10CFR52, Appendix A (refer to DCD Tier 2 Chapter 20, Questions 210.19 and 210.15). The staff's final safety evaluation report (NUREG-1503) documents the SFR quality requirements designated in Tier 2 Table 3.2-1 as acceptable.

Table 3.2-1 identifies two Notes for application of quality requirements to SFRs. Note e, for "E" as applied to SFRs under Quality Assurance Requirement, states "Elements of 10CFR50,

Appendix B are generally applied, commensurate with the importance of the equipment's function." Note (bb) also applies to SFRs and states "All quality assurance requirements shall be applied to ensure that the design, construction and testing requirements are met." The SFRs are non-nuclear safety-related Structures, Systems and Components (SSCs) and will meet the same requirements as noted in Table 3.2-1.

In the response to RAI 09.01.02-7, NINA referenced the STP 3 & 4 Quality Assurance Program Description (QAPD) Part III, to convey the applicability of all 18 Appendix B QA criteria without implying the SFRs had a safety-related function. NINA agrees that the more detailed quality requirements for the 18 criteria in Part II of the QAPD will be utilized in meeting Table 3.2-1 Note "E" and Note (bb) for the SFRs.

(2)

References:1) Nuclear Energy Institute (NEI) 07-02A Generic FSAR Template Guidance for Maintenance Rule Program Description for Plants Licensed Under 10 CFR Part 52 (ML080910148)

2) Advanced Final Safety Evaluation for Chapter 17 Regarding the South Texas Project Combined License Application, dated March 22, 2011 (ML110280134)

Reference 1) is incorporated by reference in the STP 3 & 4 FSAR Section 17.6S Maintenance Rule and will ensure that the guidance provided in RG 1.160 is implemented. Section 17.6S was reviewed and accepted by the staff in reference 2.

The Maintenance Rule Program is an operational program implemented prior to fuel load, as shown in FSAR Table 13.4S-1. Safety-related and nonsafety-related SSCs satisfying the Maintenance Rule scoping criteria of Reference 1 will be included in the program.

The scoping process is expected to consider such factors as that the SFRs are non-safety related, are passive structures and are normally operating (i.e., not in standby within the meaning of RG 1.160) in a narrow temperature range below 140°F in a mild aqueous solution. The scoping process will also consider whether the general structural features, materials and operating environment of the STP 3 & 4 SFRs are similar to other SFRs in the current generation of operating domestic and foreign nuclear power plants, such that the industry's many reactor years of operational experience with SFRs would be relevant, and whether the industry experience suggests the need for any special procedures or programs to monitor SFRs for structural degradation. The SFR configuration would support inspections since the racks can be accessed from above by way of empty storage cell locations and areas below the baseplate could be accessed by holes at the base of the storage cells or from adjacent areas in the pool without SFRs.

Based on the above NINA concludes no update to the technical report is necessary.

The responses provided to questions 1 and 2 above do not require a change to the COLA.

STP 3&4 Fuel Storage Rack RAI Response Roadmap

This cross reference table is a reviewer's aid, and not intended to provide any new or different information from what is provided in the RAI responses.

RAI No.	RAI item	References (Note 1)
09.01.02-2, Revision 1	a	Section 3, Figures 3-3, 3-4 & 3-5, and Appendix A, Sketches A-1 through A-13. **For RAI 09.01.02-11 (a)**: 1. Section 3, Figures 3-1 and 3-2 2. Section 8.2.4 and Reference 3 to the WCAP 3. Sketch A-2 4. See response in the RAI
	b	a) Section 3 Figures 3-1 and 3-2 b) (See Note 2) c) See response in RAI d) See response in RAI e) See response in RAI
	c	Section 3, Table 3-3
	d	(See Note 2) Section 1 Introduction
	e	Section 3, Figures 3-3 & 3-4 and Appendix Sketch A-11
	f	(See Note 2)
	g	Figures 4-8, 4-34, 8-4, Appendix Sketch A-1, & A-13
	h	Appendix A Sketches A-4, A-6, A-7, A-5 & A-9 **For RAI 09.01.02-11 (h)**: 1. Section 3, Figure 3-2 2. Section 8.2.4 and Reference 3 to the WCAP
	i	Appendix A Sketches A-3, A-5, A-6, A-7, A-9, A-10, A-11 and A-13
09.01.02-3, Revision 1	a	Table 4-7, Section 4.3.3, Sections 8.1, 8.2 and 8.4
	b	Use of 212°F (ref Section 5.3) for material properties and limits for all service conditions is explained in the RAI response.
	c	Section 8.4 **For RAI 09.01.02-12 (c):** Section 8.4.3

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09.01.02-4, Revision 1	a	Section 8.3 Figure 8-4 **Refer to RAI 09.01.02-13 regarding supplemental fuel drop questions.**
	b	Sections 8.3.3 part 2, & 8.3.4 Figure 8-6
	c	Answered in RAI response
	d	Answered in RAI response
	e	Section 8.3.5 Figures 8-7 & 8-8
09.01.02-5, Revision 1	a	(See Note 2)
	b	Section 4.2.2.1 Figure 4-10
	c	Answered in RAI response. (1) Fuel-to-cell wall: Values appear in Section 4.2.3.2.3, Figure 4-29 (2) Rack-to-floor: 4.2.3.2.4
	d	**Includes response to RAI 09.01.02-14 (d)** Figures 4-29, 4-16 & 4-17
	e	**Includes response to RAI 09.01.02-14 (e)** Answered in RAI response Rack-to-Rack: Figure 4-21 & Section 4.2.3.2.1 Fuel-to-Cell Wall: Figure 4-20 & Section 4.2.3.2.3 Rack-to-Pool Wall: Figures 4-22 & 4-23, Table 4-3, & Section 4.2.3.2.1 Verification: Reference 9 to WCAP, Table 4-2
	f	Answered in RAI response.
	g	Answered in RAI response.
	h	Answered in RAI response. Figure 4-8 Details in Section 4.2.2.1.
	i	Answered in RAI response Linkage assembly: Appendix Sketch A-9 Figure 4-14, 4-9, Appendix Sketch A-9
	j	Answered in RAI response
	k	Answered in RAI response

STP 3&4 Fuel Storage Rack RAI Response Roadmap

	l	Reference figures in response to 09.01.02-2. Modeling of welds in ANSYS: Figures 4-10 & 4-11 Grid to Baseplate: Figure 4-12 Support plate to Baseplate: Figure 4-13 Details of modeling and evaluations: Reference 3 to WCAP
	m	Explained in RAI response Validation of model: Section 4.2.2.2. Details: Section 4.2.3.2.5
	m	Loading pattern basis: Section 4.2.3.2.6. Answered in RAI response
	o	Computer programs listed in Section 6 Validation per Westinghouse Procedures NSNP 3.6.5 and 3.6.2
09.01.02-6, Revision 1	a	(See Note 2) **Includes response to RAI 09.01.02-15 (a)** Weld stress results: Sections 8.2.2, 8.2.3, 8.2.4 and 8.2.5 Weld analysis details: Provided in Reference 3 to WCAP Mesh shown in Figure 4-10 and discussed in RAI response Modeling of weld joints: Section 4.2.2.1 Baseplate to support plate: Section 4.2.4
	b	Max impact & uplift: Section 8.1, Max accelerations: Subsection 8.1.2.1
	c	Stress evaluations: Sections 4.2.4 and 4.2.5 Stress ratios: Sections 8.2.2, 8.2.3 and 8.2.4 Evaluation Details: Reference 3 to WCAP
	d	Level A combinations: Refer to response to RAI 09.01.02-3, Revision 1, item a. Buckling analysis: Section 8.2.4 & Table 8-7, Note (1)
	e	Section 8.2.3 Reference 3 to WCAP
	f	(Note 2)
09.01.02-7	--	Refer to RAI 09.01.02-16.
09.01.02-8, Revision 1	--	Section 8.5
09.01.02-9, Revision 1	--	Refer to U7-C-NINA-NRC-110109 for RAI 09.01.02-9, Revision 1 response.
09.01.02-10	a	Section 8.1.2

STP 3&4 Fuel Storage Rack RAI Response Roadmap

	b	Answered in RAI response.
	c	Answered in RAI response.
	d	Answered in RAI response.
	e	Answered in RAI response.
09.01.02-11	a	Refer to RAI 09.01.02-2, Revision 1, item a.
	h	Refer to RAI 09.01.02-2, Revision 1, item h.
09.01.02-12	c	Refer to RAI 09.01.02-3, Revision 1, item c.
09.01.02-13	a	Supplemental response to RAI 09.01.02-4 item a. Live load Fuel Drop: Section 8.3.4 Modeling of base plate with flow holes: Section 8.3.5 & Figures 8-9 & 8-10
09.01.02-14	d	Refer to RAI 09.01.02-5, Revision 1, item d.
	e	Refer to RAI 09.01.02-5, Revision 1, item e.
	--	Figure 4-22
09.01.02-15	a	Refer to RAI 09.01.02-6, Revision 1, item a.
09.01.02-16	--	Follow-up to RAI 09.01.02-7 Answered in RAI response.

Note 1: All references (*e.g.*, sections, figures, sketches and References) are to the technical report WCAP-17331-P Revision 2 unless otherwise stated.

Note 2: RAI items regarding new fuel racks are no longer applicable, since there are no fuel storage racks in the new fuel storage vault (Tier 1 departure STP DEP T1 2.5-1), letter U7-C-NINA-NRC-110098, dated July 19, 2011 (ML11202A268).

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CAW-11-3311

November 14, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY INFORMATION FROM PUBLIC DISCLOSURE

Subject: WEC-NINA-2011-0031 P-Enclosure, Revision 1, "Response to RAI 09.01.02-5, Revision 1, for the Spent Fuel Racks -- South Texas Project Units 3 & 4" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced document is further identified in Affidavit CAW-11-3311 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Nuclear Innovation North America (NINA).

Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference CAW-11-3311 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

B. F. Maurer, Manager
ABWR Licensing

Enclosures

cc: R. Foster (NRC TWFN 6 D38M)

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B. F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 14th day of November 2011

Cynthia Olesky
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
Member, Pennsylvania Association of Notaries

(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in WEC-NINA-2011-0031 P-Enclosure, Revision 1, "Response to RAI 09.01.02-5, Revision 1, for the Spent Fuel Racks -- South Texas Project Units 3 & 4" (Proprietary) for submittal to the Commission, being transmitted by Nuclear Innovation North America (NINA) letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC's review of the spent fuel racks for South Texas Project Units 3&4.

This information is part of that which will enable Westinghouse to:

(a) Assist the customer in obtaining NRC review of the structural analysis of the spent fuel racks for South Texas Project 3&4.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of plant specific spent fuel rack structural analysis and methodology development for ABWR licensing basis applications.

(b) Its use by a competitor would improve their competitive position in the design and licensing of a similar product for ABWR spent fuel rack design and analysis.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

Copyright Notice

Westinghouse

Westinghouse Electric Company LLC
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4419
Direct fax: (724) 720-0857
e-mail: maurerbf@westinghouse.com
WEC-NINA-2011-0032

CAW-11-3281

November 8, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WEC-NINA-2011-0032 P-Enclosure, "Response to RAI 09.01.02-10 for the Spent Fuel Racks -- South Texas Project Units 3 & 4" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced document is further identified in Affidavit CAW-11-3281 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Nuclear Innovation North America (NINA).

Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference CAW-11-3281 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

B. F. Maurer, Manager
ABWR Licensing

Enclosures

cc: R. Foster (NRC TWFN 6 D38M)

CAW-11-3281

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B. F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 8th day of November 2011

Cynthia Olesky
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
Member, Pennsylvania Association of Notaries

(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in WEC-NINA-2011-0032 P-Enclosure, "Response to RAI 09.01.02-10 for the Spent Fuel Racks -- South Texas Project Units 3 & 4" (Proprietary) for submittal to the Commission, being transmitted by Nuclear Innovation North America (NINA) letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC's review of the spent fuel racks for South Texas Project Units 3&4.

This information is part of that which will enable Westinghouse to:

(a) Assist the customer in obtaining NRC review of the structural analysis of the spent fuel racks for South Texas Project 3&4.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of plant specific spent fuel rack structural analysis and methodology development for ABWR licensing basis applications.

(b) Its use by a competitor would improve their competitive position in the design and licensing of a similar product for ABWR spent fuel rack design and analysis.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

Transmitted herewith are proprietary and/or non-proprietary versions of documents furnished to the NRC in connection with requests for generic and/or plant-specific review and approval.

In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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Westinghouse

Westinghouse Electric Company LLC
Nuclear Services
1000 Westinghouse Drive
Cranberry Township, Pennsylvania 16066
USA

U.S. Nuclear Regulatory Commission
Document Control Desk
11555 Rockville Pike
Rockville, MD 20852

Direct tel: (412) 374-4419
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e-mail: maurerbf@westinghouse.com
WEC-NINA-2011-0034

CAW-11-3298

November 8, 2011

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WCAP-17331-P, Revision 2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced document is further identified in Affidavit CAW-11-3298 signed by the owner of the proprietary information, Westinghouse Electric Company LLC. The affidavit, which accompanies this letter, sets forth the basis on which the information may be withheld from public disclosure by the Commission and addresses with specificity the considerations listed in paragraph (b)(4) of 10 CFR Section 2.390 of the Commission's regulations.

Accordingly, this letter authorizes the utilization of the accompanying affidavit by Nuclear Innovation North America (NINA).

Correspondence with respect to the proprietary aspects of this application for withholding or the accompanying affidavit should reference CAW-11-3298 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

Very truly yours,

B. F. Maurer, Manager
ABWR Licensing

Enclosures

cc: R. Foster (NRC TWFN 6 D38M)

Affidavit for Withholding Confidential and Proprietary Information from Public Disclosure under 10 CFR § 2.390

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of

STP Nuclear Operating Company — Docket Nos.52-012, 52-013

South Texas Project
Units 3 and 4

AFFIDAVIT

I, Yasuhiro Yuguchi, being duly sworn, hereby depose and state that I am Group Manager, Control Rod Drive & Service System Engineering Group, System Design & Engineering Department, Nuclear Energy Systems & Services Division, Power Systems Company, Toshiba Corporation; that I am duly authorized by Toshiba Corporation to sign and file with the Nuclear Regulatory Commission the following application for withholding Toshiba Corporation's confidential and proprietary information from public disclosure; that I am familiar with the content thereof; and that the matters set forth therein are true and correct to the best of my knowledge and belief.

In accordance with 10 CFR § 2.390(b)(ii), I hereby state, depose, and apply as follows on behalf of Toshiba Corporation:

(A) Toshiba Corporation seeks to withhold from public disclosure the response to RAI 09.01.02-10, and WCAP-17331-P, Rev.2 and information identified in brackets as Toshiba proprietary information therein (collectively, "Confidential Information").

(B) The Confidential Information is owned by Toshiba Corporation. In my position as Group Manager, Control Rod Drive & Service System Engineering Group, System Design & Engineering Department, Nuclear Energy Systems & Services Division, Power System Company, Toshiba Corporation, I have been specifically delegated the function of reviewing the Confidential Information and have been authorized to apply for its withholding on behalf of Toshiba Corporation.

(C) The RAI response and WCAP-17331-P, Rev.2 contain information related to the structural analysis of the Spent Fuel Storage Racks for South Texas Project Units 3&4 Combined License Application to the Nuclear Regulatory Commission. The Confidential Information which is entirely confidential and proprietary to Toshiba Corporation is indicated in the document using brackets annotated with "Toshiba".

(D) Consistent with the provisions of 10 CFR § 2.390(a)(4), the basis for proposing that the Confidential Information be withheld is that it constitutes Toshiba Corporation's trade

CAW-11-3298

AFFIDAVIT

COMMONWEALTH OF PENNSYLVANIA:

ss

COUNTY OF BUTLER:

Before me, the undersigned authority, personally appeared B. F. Maurer, who, being by me duly sworn according to law, deposes and says that he is authorized to execute this Affidavit on behalf of Westinghouse Electric Company LLC (Westinghouse), and that the averments of fact set forth in this Affidavit are true and correct to the best of his knowledge, information, and belief:

B. F. Maurer, Manager
ABWR Licensing

Sworn to and subscribed before me
this 8th day of November 2011

Cynthia Olesky
Notary Public

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Cynthia Olesky, Notary Public
Manor Boro, Westmoreland County
My Commission Expires July 16, 2014
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(1) I am Manager, ABWR Licensing, in Nuclear Services, Westinghouse Electric Company LLC (Westinghouse), and as such, I have been specifically delegated the function of reviewing the proprietary information sought to be withheld from public disclosure in connection with nuclear power plant licensing and rule making proceedings, and am authorized to apply for its withholding on behalf of Westinghouse.

(2) I am making this Affidavit in conformance with the provisions of 10 CFR Section 2.390 of the Commission's regulations and in conjunction with the Westinghouse Application for Withholding Proprietary Information from Public Disclosure accompanying this Affidavit.

(3) I have personal knowledge of the criteria and procedures utilized by Westinghouse in designating information as a trade secret, privileged or as confidential commercial or financial information.

(4) Pursuant to the provisions of paragraph (b)(4) of Section 2.390 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure should be withheld.

(i) The information sought to be withheld from public disclosure is owned and has been held in confidence by Westinghouse.

(ii) The information is of a type customarily held in confidence by Westinghouse and not customarily disclosed to the public. Westinghouse has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The application of that system and the substance of that system constitutes Westinghouse policy and provides the rational basis required.

Under that system, information is held in confidence if it falls in one or more of several types, the release of which might result in the loss of an existing or potential competitive advantage, as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Westinghouse's

competitors without license from Westinghouse constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Westinghouse, its customers or suppliers.

(e) It reveals aspects of past, present, or future Westinghouse or customer funded development plans and programs of potential commercial value to Westinghouse.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Westinghouse system which include the following:

(a) The use of such information by Westinghouse gives Westinghouse a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Westinghouse competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Westinghouse ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Westinghouse at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Westinghouse of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Westinghouse in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Westinghouse capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

(iii) The information is being transmitted to the Commission in confidence and, under the provisions of 10 CFR Section 2.390; it is to be received in confidence by the Commission.

(iv) The information sought to be protected is not available in public sources or available information has not been previously employed in the same original manner or method to the best of our knowledge and belief.

(v) The proprietary information sought to be withheld in this submittal is that which is appropriately marked in WCAP-17331-P, Revision 2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (Proprietary) for submittal to the Commission, being transmitted by Nuclear Innovation North America (NINA) letter and Application for Withholding Proprietary Information from Public Disclosure, to the Document Control Desk. The proprietary information as submitted by Westinghouse is that associated with the NRC's review of the spent fuel racks for South Texas Project Units 3&4.

This information is part of that which will enable Westinghouse to:

(a) Assist the customer in obtaining NRC review of the structural analysis of the spent fuel racks for South Texas Project 3&4.

Further this information has substantial commercial value as follows:

(a) Westinghouse plans to sell the use of this information to its customers for purposes of plant specific spent fuel rack structural analysis and methodology development for ABWR licensing basis applications.

(b) Its use by a competitor would improve their competitive position in the design and licensing of a similar product for ABWR spent fuel rack design and analysis.

(c) The information requested to be withheld reveals the distinguishing aspects of a methodology which was developed by Westinghouse.

Public disclosure of this proprietary information is likely to cause substantial harm to the competitive position of Westinghouse because it would enhance the ability of competitors to provide similar technical evaluations and licensing defense services for commercial power reactors without commensurate expenses. Also, public disclosure of the information would enable others to use the information to meet NRC requirements for licensing documentation without purchasing the right to use the information.

The development of the technology described in part by the information is the result of applying the results of many years of experience in an intensive Westinghouse effort and the expenditure of a considerable sum of money.

In order for competitors of Westinghouse to duplicate this information, similar technical programs would have to be performed and a significant manpower effort, having the requisite talent and experience, would have to be expended.

Further the deponent sayeth not.

Proprietary Information Notice

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In order to conform to the requirements of 10 CFR 2.390 of the Commission's regulations concerning the protection of proprietary information so submitted to the NRC, the information which is proprietary in the proprietary versions is contained within brackets, and where the proprietary information has been deleted in the non-proprietary versions, only the brackets remain (the information that was contained within the brackets in the proprietary versions having been deleted). The justification for claiming the information so designated as proprietary is indicated in both versions by means of lower case letters (a) through (f) located as a superscript immediately following the brackets enclosing each item of information being identified as proprietary or in the margin opposite such information. These lower case letters refer to the types of information Westinghouse customarily holds in confidence identified in Sections (4)(ii)(a) through (4)(ii)(f) of the affidavit accompanying this transmittal pursuant to 10 CFR 2.390(b)(1).

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secrets and confidential and proprietary commercial information.

(E) Public disclosure of the Confidential Information is likely to cause substantial harm to Toshiba Corporation's competitive position and its business relations with another company.

Toshiba Corporation has a rational basis for determining the types of information customarily held in confidence by it, and utilizes a system to determine when and whether to hold certain types of information in confidence.

The basis for claiming the information so designated as proprietary is as follows:

(a) The information reveals the distinguishing aspects of a process (or component, structure, tool, method, etc.) where prevention of its use by any of Toshiba Corporation's competitors without license from Toshiba Corporation constitutes a competitive economic advantage over other companies.

(b) It consists of supporting data, including test data, relative to a process (or component, structure, tool, method, etc.), the application of which data secures a competitive economic advantage, e.g., by optimization or improved marketability.

(c) Its use by a competitor would reduce his expenditure of resources or improve his competitive position in the design, manufacture, shipment, installation, assurance of quality, or licensing a similar product.

(d) It reveals cost or price information, production capacities, budget levels, or commercial strategies of Toshiba Corporation, its customers or suppliers.

(e) It reveals aspects of past, present, or future Toshiba Corporation or customer funded development plans and programs of potential commercial value to Toshiba Corporation.

(f) It contains patentable ideas, for which patent protection may be desirable.

There are sound policy reasons behind the Toshiba Corporation system which include the following:

(a) The use of such information by Toshiba Corporation gives Toshiba Corporation a competitive advantage over its competitors. It is, therefore, withheld from disclosure to protect the Toshiba Corporation competitive position.

(b) It is information that is marketable in many ways. The extent to which such information is available to competitors diminishes the Toshiba Corporation ability to sell products and services involving the use of the information.

(c) Use by our competitor would put Toshiba Corporation at a competitive disadvantage by reducing his expenditure of resources at our expense.

(d) Each component of proprietary information pertinent to a particular competitive advantage is potentially as valuable as the total competitive advantage. If competitors acquire components of proprietary information, any one component may be the key to the entire puzzle, thereby depriving Toshiba Corporation of a competitive advantage.

(e) Unrestricted disclosure would jeopardize the position of prominence of Toshiba Corporation in the world market, and thereby give a market advantage to the competition of those countries.

(f) The Toshiba Corporation capacity to invest corporate assets in research and development depends upon the success in obtaining and maintaining a competitive advantage.

Further, on behalf of Toshiba Corporation, I affirm that:

(i) The Confidential Information is confidential and proprietary information of Toshiba Corporation.

(ii) The Confidential Information is information of a type customarily held in confidence by Toshiba Corporation, and there is a rational basis for doing so given the sensitive and valuable nature of the Confidential Information as discussed above in paragraphs (D) and (E).

(iii) The Confidential Information is being transmitted to the NRC in confidence.

(iv) The Confidential Information is not available in public sources.

(v) Public disclosure of the Confidential Document is likely to cause substantial harm to the competitive position of Toshiba Corporation, taking into account the value of the Confidential Information to Toshiba Corporation, the amount of money and effort expended by Toshiba Corporation in developing the Confidential Information, and the ease or difficulty with which the Confidential Information could be properly acquired or duplicated by others.

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Nov. 14, 2011
Date

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