PROPRIETARY

Nuclear Innovation
North America LLC
4000 Avenue F, Suite A
Bay City, Texas 77414

February 9, 2012
U7-C-NINA-NRC-120013
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

Attached are Nuclear Innovation North America LLC (NINA) responses to staff questions in Request for Additional Information (RAI) letter number 415 and a revised response related to Combined License Application (COLA) Part 2, Tier 2, Section 9.1, "Fuel Storage and Handling." The attachments to this letter include non-proprietary responses (Attachments 1, 2 and 3) and proprietary responses (Attachments 5, 6 and 7) to the following RAIs:

09.01.02-9 Revision 2 | 09.01.02-17 | 09.01.02-28

The proprietary RAI responses are proprietary to Westinghouse and are supported by affidavit (Attachment 4) signed by Westinghouse, 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 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-12-3388 and should be addressed to J. A. Gresham, Manager, Regulatory Compliance, Westinghouse Electric Company LLC, Suite 428, 1000 Westinghouse Drive, Cranberry Township, Pennsylvania 16066.

When separated from the proprietary responses in Attachments 5, 6 and 7, this letter is not proprietary.

There are no commitments in this letter.

If there are any questions regarding this submittal, please contact Scott Head at (361) 972-7136, or Bill Mookhoek at (361) 972-7274.

D091
NRO

STI 33321804

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

Executed on 2/9/2012

Mark McBurnett
Senior Vice President, Oversight & Regulatory Affairs
Nuclear Innovation North America LLC

jaa

Attachments:
1. RAI 09.01.02-9 Response Revision 2 (non-proprietary)
2. RAI 09.01.02-17 Response (non-proprietary)
3. RAI 09.01.02-28 Response (non-proprietary)
4. Affidavit
5. RAI 09.01.02-9 Response Revision 2 (proprietary)
6. RAI 09.01.02-17 Response (proprietary)
7. RAI 09.01.02-28 Response (proprietary)

cc: w/o attachment except*
(paper copy)

Director, Office of New Reactors
U. S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2738

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
1600 E. Lamar Blvd
Arlington, Texas 76011-4511

Kathy C. Perkins, RN, MBA
Assistant Commissioner
Division for Regulatory Services
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

Alice Hamilton Rogers, P.E.
Inspection Unit Manager
Texas Department of State Health Services
P. O. Box 149347
Austin, Texas 78714-9347

*Steven P. Frantz, Esquire
A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP
1111 Pennsylvania Ave. NW
Washington D.C. 20004

*Rocky Foster
Two White Flint North
11545 Rockville Pike
Rockville, MD 20852

(electronic copy)

*George F. Wunder
*Rocky Foster
Charles Casto
U. S. Nuclear Regulatory Commission

Jamey Seely
Nuclear Innovation North America

Richard Peña
Kevin Pollo
L. D. Blaylock
CPS Energy

RAI 09.01.02-9

QUESTION:

Summary: Provide additional information about the seismic loading for the nonlinear time history analysis of the spent fuel racks.

Section 4.1 of the spent fuel racks Technical Report describes the time history input for the nonlinear analysis of the spent fuel racks. Quoting from the Technical Report:

"The safe shutdown earthquake (SSE) time histories are provided in the Westinghouse calculation note for the generation of artificial seismic time histories [6]. The spent fuel layout drawing in Figure 4-1 details the coordinate system for the seismic inputs from [6]. The x-axis is oriented along plane north, the y-axis is oriented along plane west, and the z-axis is oriented in the vertical direction according to the right-hand rule. The response spectra used for creating the artificial time history are taken from node 100 in the DCD Tier 2, Appendix 3A, Revision 4 [2]. This node corresponds to the reactor building at elevation 77.10 feet (23.5 meters). The base of the spent fuel pool is at 64.96 feet (19.8 meters), and the top of the racks is at 81.36 feet (24.8 meters). Therefore, the developed time history accounts for the wall amplification very near the top of the spent fuel racks."

"The acceleration versus time data for the x, y, and z directions are shown in Figure 4-2 through Figure 4-4. Baseline corrected displacement time histories are developed using these accelerations. The displacement versus time data for the x, y, and z directions are shown in Figure 4-5."

The staff reviewed the single horizontal and vertical response spectra for node 100 in Reference 2 of the Technical Report, and confirmed that the ZPAs of the horizontal and vertical spectra are consistent with the maximum instantaneous accelerations in Figures 4-2 through 4-4 of the Technical Report. However, a considerable amount of information that the staff typically reviews to confirm the adequacy of synthetic time histories to match target spectra is not included in the Technical Report. In addition, the staff's review of Figures 4-2 through 4-5 identified a number of characteristics that require clarification and explanation. Therefore, the staff requests that the applicant provide the following additional information, to assist the staff in making a determination whether the seismic input has been developed in accordance with the guidance specified in SRP 3.7.1, Revision 3:

a. Confirm that the 3 synthetic time histories have been checked against each other to ensure statistical independence. Compare the calculated correlation coefficients to the acceptance criterion of ≤ 0.16. Include this information in the spent fuel racks technical report.

b. Provide figures comparing the 5% damped spectra (2 horizontal, vertical) generated from the synthetic time histories to the 5% damped target spectra (horizontal, vertical) at node 100. Identify the criteria used to verify the adequacy of the match. Include this information in the spent fuel racks technical report.

c. Describe how target PSDs were developed for the Node 100 target spectra, and provide figures comparing the PSDs for the synthetic time histories to the PSDs for the target spectra. Identify the criteria used to verify the adequacy of the PSDs for the synthetic time histories.

d. The plots of the horizontal synthetic time histories presented in Figures 4-2 and 4-3 of the Technical Report exhibit the characteristic that there are many acceleration peaks up to the target spectrum ZPA. It appears that these time histories are derived from traces that had higher acceleration peaks, and all the higher peaks were reduced to the ZPA. Consequently, the synthetic time histories do not look like earthquake time traces. Please explain the process used to develop the horizontal synthetic time histories, and provide the technical basis for their adequacy.

e. The second paragraph quoted above states: "Baseline corrected displacement time histories are developed using these accelerations." Explain the term "baseline corrected" and explain why it is necessary to make this correction in the ANSYS analysis. It is the staff's understanding that ANSYS would automatically remove any drift from the solution. Describe the process used to calculate the baseline correction.

f. The plots of the baseline corrected displacement time histories (x, y, z) presented in Figure 4-5 of the Technical Report exhibit several characteristics that require clarification and explanation: (1) All 3 displacement time histories exhibit a dominant sinusoidal response with a period which is same as the duration of the acceleration time history (2) All 3 displacements are zero at three specific time steps. (3) Although there is only 1 horizontal target spectrum, the peak x displacement is approximately ½ of the peak y displacement. (4) The 2 horizontal displacement histories are completely out-of-phase with each other; the vertical displacement history is perfectly in-phase with y and completely out-of-phase with x. Describe how the displacement time histories are developed from the synthetic acceleration time histories, and provide the technical basis for the adequacy of the generated displacement time histories.

REVISED RESPONSE:

NINA provided responses to RAI 09.01.02-9 items a. though f. on June 23, 2011, in letter U7-C-NINA-NRC-110084. Preliminary comments and requests for clarification were received and discussed on July 20, July 27, and August 3, 2011. A revised response for items a, b, c, d, and f was submitted in letter U7-C-NINA-NRC-110109 on August 17, 2011. The NRC subsequently issued RAI 09.01.02-21 on January 9, 2012, which requested NINA to revise the response to this RAI. This RAI response revision 2 includes the responses to all items a through f as previously provided in the initial response and revision 1 of the response, and includes revisions to items a and b that address the information request of RAI 09.01-02-21. In addition, minor editorial changes (specifically, the addition of registered trademark symbols and clarification of references to AP1000® PWR) were made as appropriate. Changes from the previous response revision are indicated with revision bars in the margins.

a. The 3 synthetic time histories have been checked against each other to ensure statistical independence, consistent with the requirements of NUREG-0800, Standard Review Plan 3.7.1 SRP Acceptance Criteria (page 9). The statistical independence criteria detailed in SRP 3.7.1 states that "When time histories are used, each of the three ground motion time histories must be shown to be statistically independent from the others. Each pair of time histories are considered to be statistically independent if the absolute value of the correlation coefficient does not exceed 0.16." Below is a summary of the Horizontal vs. Vertical Cross-Correlation Coefficients:

Comparison	@ 0 Lag (≤0.16)		Strong Motion Duration (< 0.30)
	Excel® spreadsheet	DADiSP	
X – Y	-0.087	-0.087	MAX = 0.145, MIN = -0.156
X – Z	-0.056	-0.056	MAX = 0.148, MIN = -0.166
Y – Z	0.061	0.061	MAX = 0.160, MIN = -0.163

The data in the table above was generated using 2 different calculation methods. For the cross-correlation coefficient at a time lag of 0, an Excel® spreadsheet was used. The Excel® data was verified using commercially available software (DADiSP) that can calculate cross-correlation coefficients for a 0 time lag as well as for the entire strong motion durations. The above table shows that the 3 synthetic time histories are statistically independent per the requirements of NUREG-0800, Standard Review Plan Section 3.7.1. A statement summarizing that the synthetic time histories are developed using the guidance of, and meet the criteria of, SRP Section 3.7.1 will be included in the next revision of the spent fuel racks Technical Report.

b. The following figures show the comparison of the 4% damped spectra (2 horizontal, vertical) generated from the synthetic time histories to the 4% damped target spectra (horizontal, vertical) at node 100. Per the requirements of NUREG-0800, Standard Review Plan 3.7.1, the SRP Acceptance Criteria on page 10 states that "Each calculated spectrum of the artificial time history is considered to envelop the design response spectrum when no more than five points fall below, and no more than 10 percent below, the design response spectrum." Synthetic time histories were created for 4% damping at Node 100, per the requirements of Reg Guide 1.61, "Damping Values For Seismic Design Of Nuclear Power Plants," as required for welded steel or bolted steel structural material with friction connections (RG 1.61, Table 1, "SSE Damping Values"), not the 5% as requested above.

The following table shows compliance to the NUREG-0800, Standard Review Plan Section 3.7.1 for Response Spectra Comparison (the number of points below the target is less than or equal to 5, and the maximum percent under the target is less than 10%):

Final MathCAD Run Summary

Earthquake	Direction	No. Iterations	No. Points Under (≤5)	Max. % Under (≤10%)
DE	Horizontal (x)	89	3	2.48
	Horizontal (y)	53	5	0.90
	Vertical (z)	86	5	1.87

Figures 1, 2, and 3 show that the synthetic generated time histories envelop the target response spectra using 4% damping at Node 100 for all three directions. A statement summarizing that the synthetic time histories are developed using the guidance of, and meet the validation criteria of, SRP Section 3.7.1 will be included in the next revision of the spent fuel racks Technical Report.

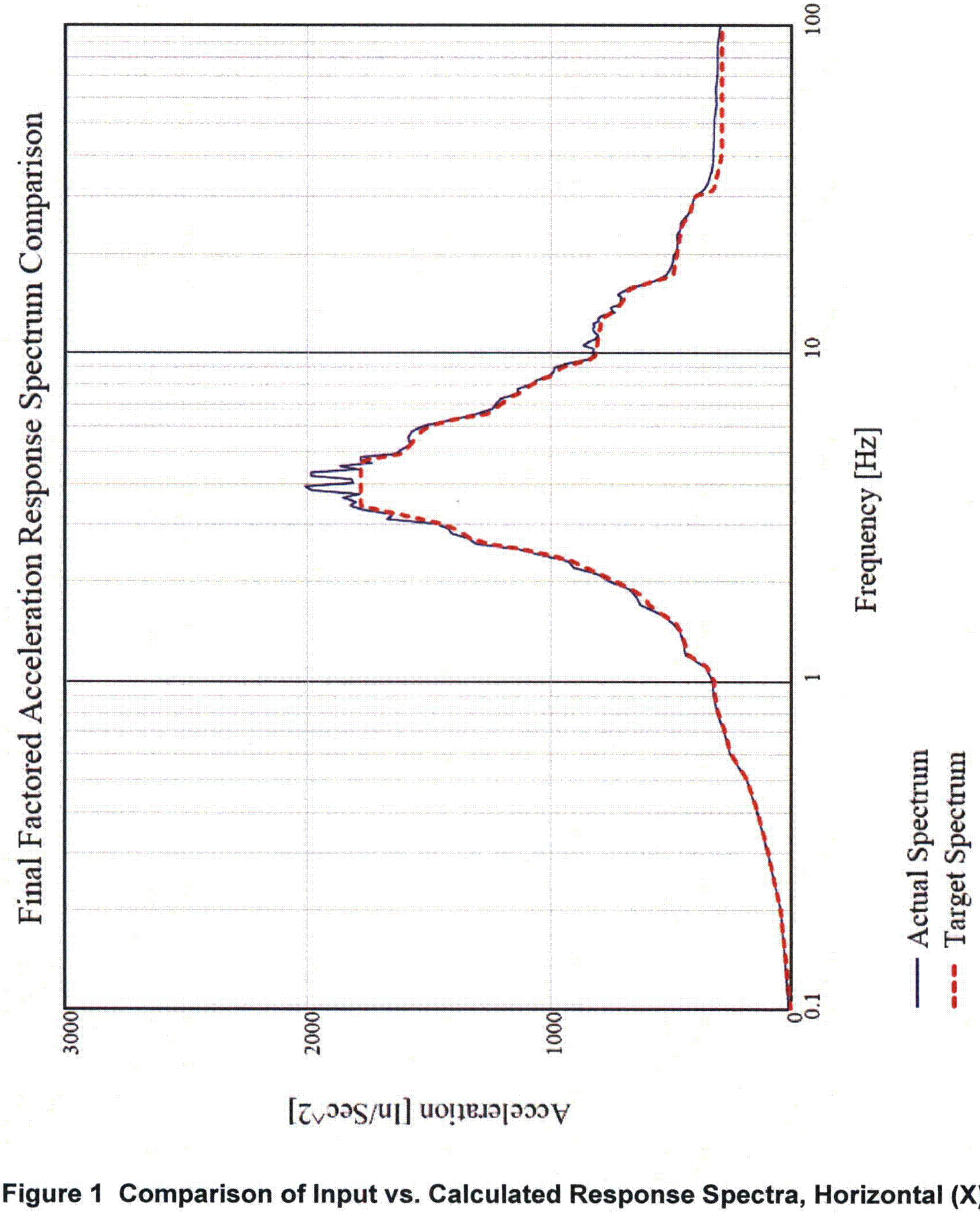

Figure 1 Comparison of Input vs. Calculated Response Spectra, Horizontal (X)

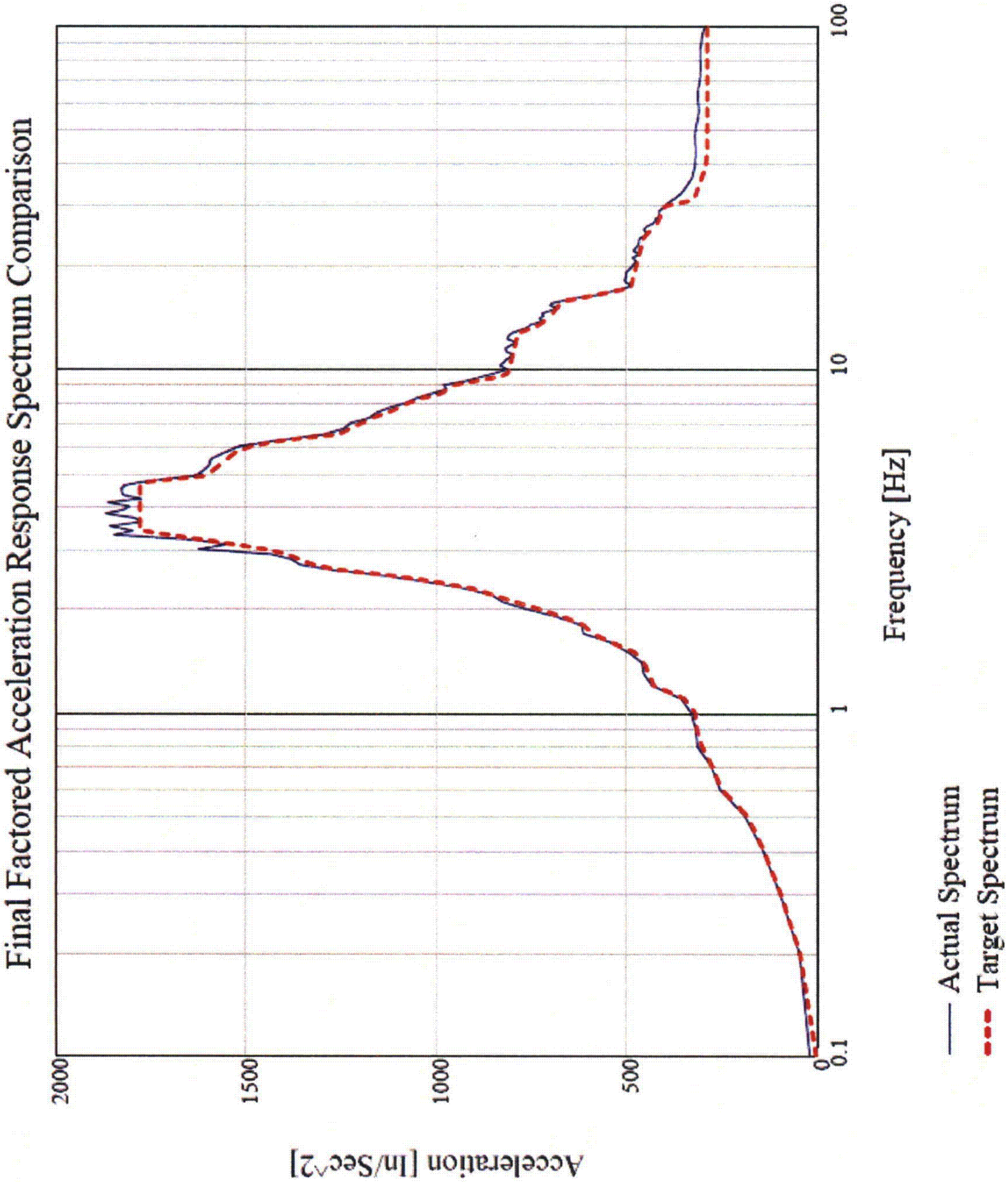

Figure 2 Comparison of Input vs. Calculated Response Spectra, Horizontal (Y)

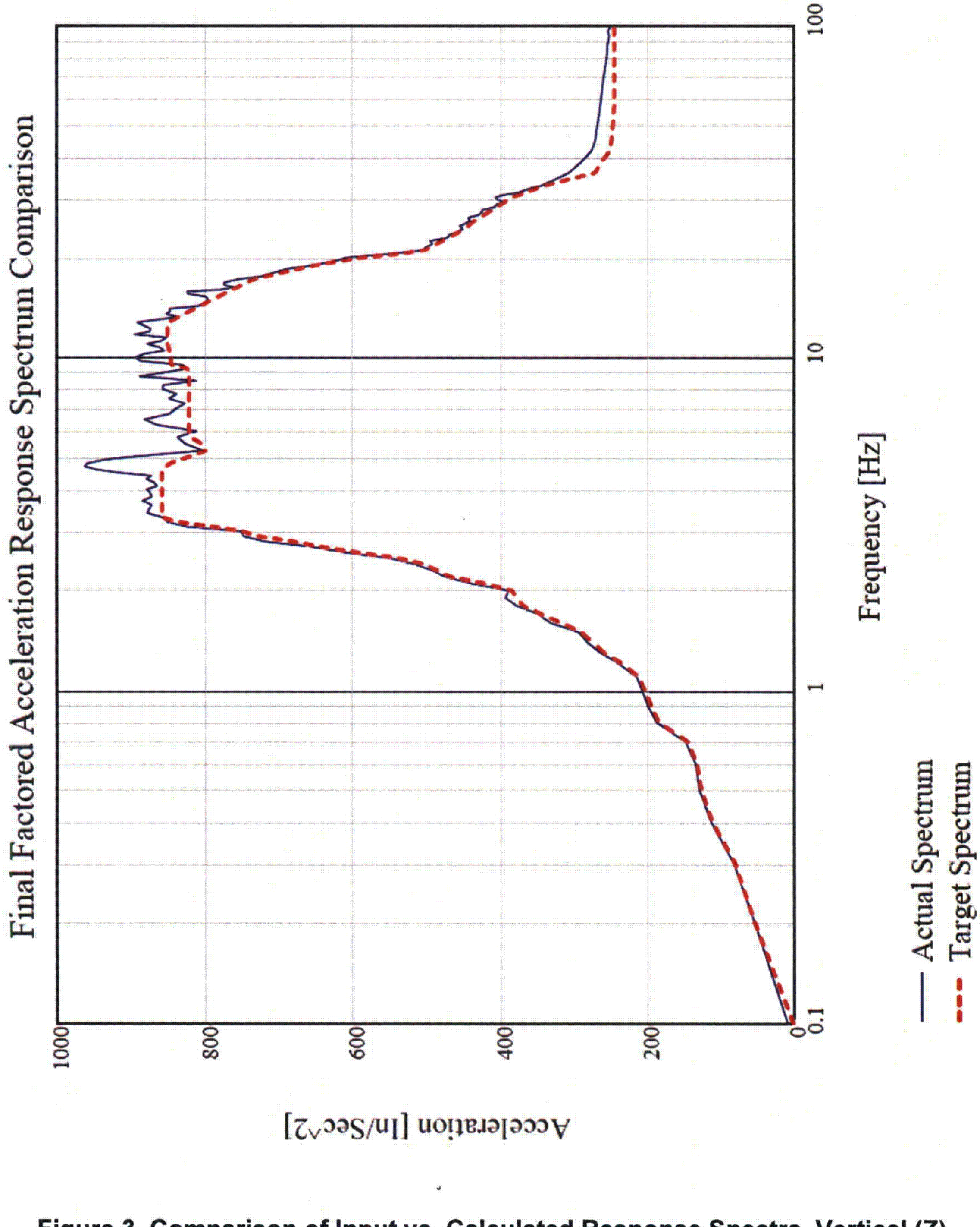

Figure 3 Comparison of Input vs. Calculated Response Spectra, Vertical (Z)

c. Target Power Spectral Density (PSD)s:

The second of the three required steps to confirm the validity of the final time histories is the minimum PSD check. The NRC provides a minimum target PSD function corresponding to seismic ground response spectra (GRS) that conform to Reg. Guide 1.60 response spectra; see Standard Review Plan 3.7.1, Appendix A. This minimum target PSD function is provided as normalized to 1.0g peak acceleration (PGA). The normalized target PSD function must be multiplied by the square of the peak acceleration from the input GRS for each curve. For STP 3&4, the peak accelerations are 0.742g horizontal and 0.630g vertical for the Design Earthquake. An Excel® spreadsheet was used to compute the normalized NRC target PSD function; multiply the values by the square of the peak acceleration above, and multiply by 80% as required.

Note that the STP 3&4 input does not meet the minimum GRS specified by Reg. Guide 1.60. The representative motion PSD is expected to be less than the Standard Review Plan 3.7.1 Appendix A target PSD associated with the Reg. Guide 1.60 spectral shape. In such cases, the NRC SRP Section 3.7.1 suggests that a compatible target PSD should be generated.

To develop a site-specific target PSD, the Westinghouse computer code PowerSpec version 2.0.2, Module 2 was used to generate a PSD from the STP-specific Design Basis Response Spectra (DBRS) at 4% damping. The resulting calculated target horizontal and vertical PSDs were used for comparison to the actual average PSD generated from the artificial time histories.

The Westinghouse computer code PowerSpec version 2.0.2, Module 8 was then used to generate the actual raw one-sided PSD functions from the final artificial acceleration time histories. PowerSpec produces two output files: one contains the PSD results, and the other summarizes the run information including the input and output data.

Standard Review Plan 3.7.1 Appendix A requires that "At any frequency f, the average PSD is computed over a frequency band width of ±20% centered on the frequency f." The average of the raw PSDs is computed with the same Excel® spreadsheet discussed above.

Figures 4, 5, and 6 are plots of the 80% NRC target PSD function, the actual raw PSD, the actual average PSD, and the site-specific target PSD function for each case.

It can be seen that the actual average PSD curves are above the STP-specific target PSD curves with exceptions as follows:

- X direction, around 15Hz, the actual average is approximately equal to the target.
- Y direction, around 0.32 Hz, the actual average is below the target.

The PSD check that is required by SRP Section 3.7.1 is for synthetic motion generated at the ground level. Because the STP 3&4 synthetic motion is at a higher elevation within containment, the PSD check has been conservatively applied at the higher elevation. There

are two small frequency ranges (between 0.3-0.4 Hz in the horizontal "Y" direction and between 10-20 Hz in the horizontal "X" direction) where the actual PSD is below the site specific target PSD. The actual PSD is very close to the target PSD within these frequency ranges, and because the input response spectra is at an elevation above ground level, the artificial time history data is deemed acceptable.

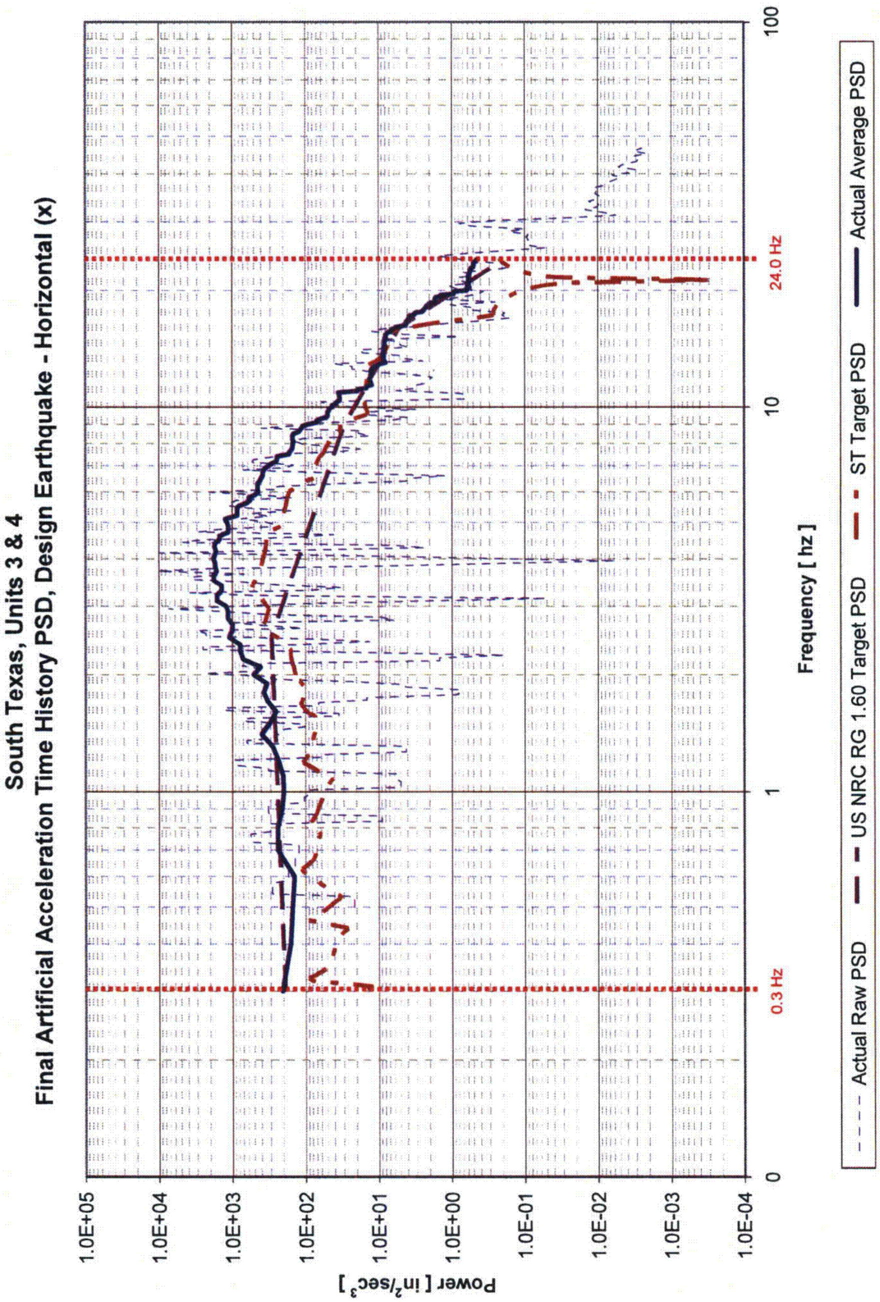

Figure 4 Actual Raw and Average PSD vs. Target – Horizontal (X)

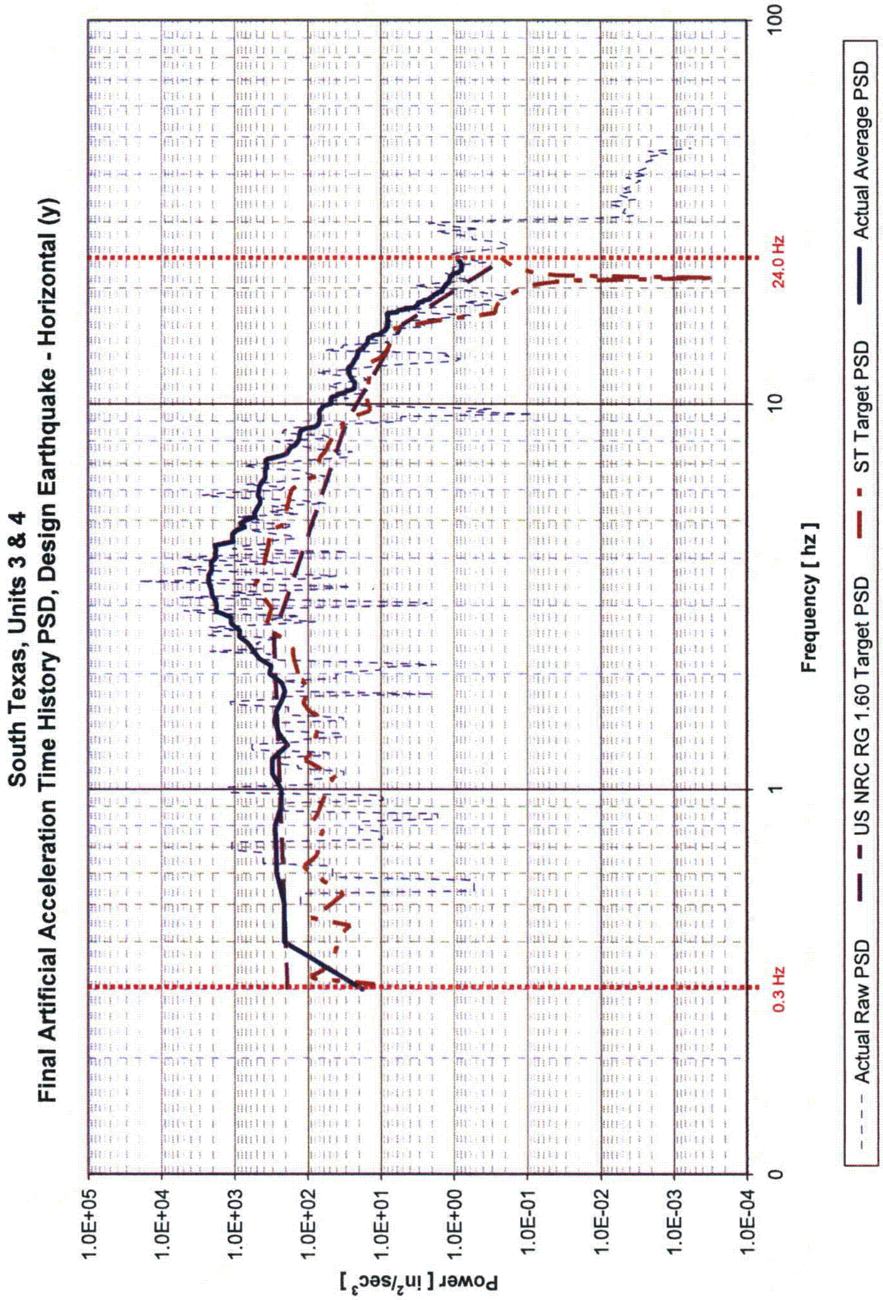

Figure 5 Actual Raw and Average PSD vs. Target – Horizontal (Y)

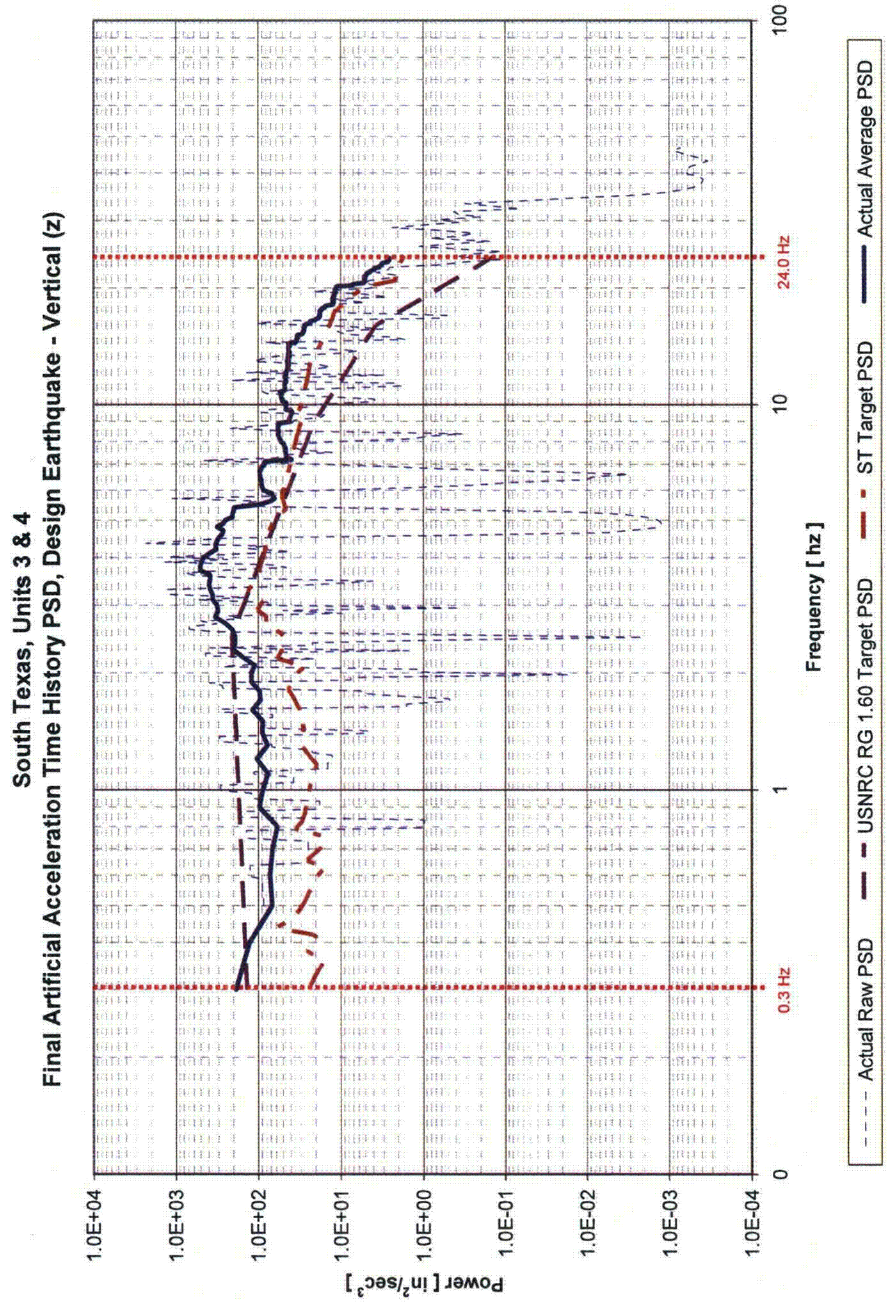

Figure 6 Actual Raw and Average PSD vs. Target PSD – Vertical (Z)

d. Process used to generate synthetic time histories

The process used to generate the artificial time histories is the same process used by Westinghouse to generate artificial time histories for the AP1000® PWR spent fuel rack licensing effort. This approach yielded results that meet the requirements of NUREG-0800, SRP 3.7.1 as described in the response to c. above. The methodology uses a MathCAD spreadsheet to perform an iterative calculation, which converts a starting recorded earthquake ground motion, in this case the El Centro earthquake, to a time history with a calculated response spectrum that closely matches the target input seismic response spectrum. If, during an iteration, the acceleration exceeds the specified Zero Period Acceleration (ZPA), the worksheet automatically lowers the value to the ZPA (also known as "clipping"). This is a standard part of the methodology, and results in synthetic time histories that closely match the target response spectra. The resulting time histories (design-basis time histories) are used in the design and analysis of the spent fuel racks.

As part of the response to the RAI, Westinghouse created a second set of artificial time histories, using an alternative method, for the sole purpose of confirming the adequacy of the original time histories used in the fuel rack analysis. The alternative method of producing artificial acceleration time histories is a mathematical approach of overlapping sine waves. This approach is available in PowerSpec 2.0.2 software. This software tool provides limited control of the ramp in and out of the strong motion portion of the event; however, there is less control over the matching of the calculated response spectrum (therefore, results may include overly conservative peaks in acceleration at any number of frequency points within the spectrum). A number of test cases were evaluated. These curves did have the classic appearance (i.e., ramp in and ramp out) and did not require "clipping" to maintain ZPA. Two successive integrations of the artificial acceleration time histories produce velocity and displacement time histories that did not exhibit "drift" and therefore does not require baseline or "drift" correction. This alternate method produced very similar results compared to the first (MathCAD) method. A comparison of acceleration time history results are included in Figures 7 through 12. For additional comparison, as further discussed in part f., a single rack model was run, with input generated from both the design-basis time histories and the second set of time histories. These results are also very similar, which confirms the adequacy of the design-basis time histories.

In summary, the design-basis time histories were created using the same methodology as that accepted for the AP1000® PWR spent fuel rack seismic analysis, and they satisfy the acceptance criteria as provided in NUREG-0800, SRP 3.7.1. To confirm these original time histories, a second set of time histories was created using an alternative method. The second set of time histories closely matches the originals, and test runs using input from both time histories provide similar results. Therefore, the design-basis time histories are confirmed to be acceptable.

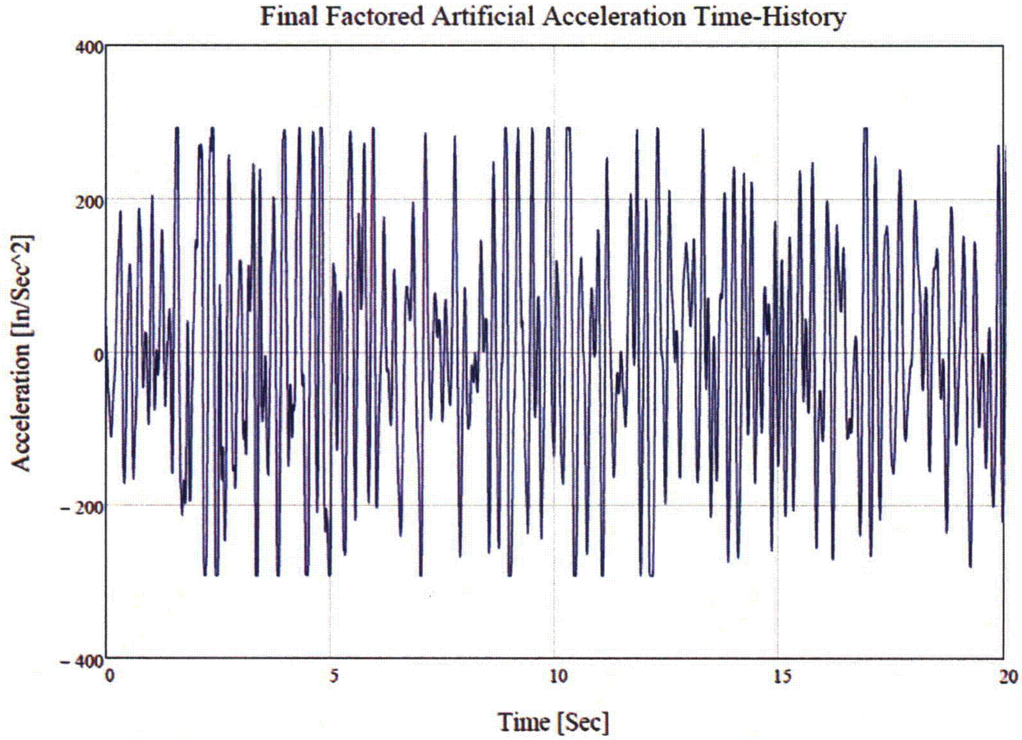

Figure 7: Original Acceleration Time History – X Direction (Horizontal)

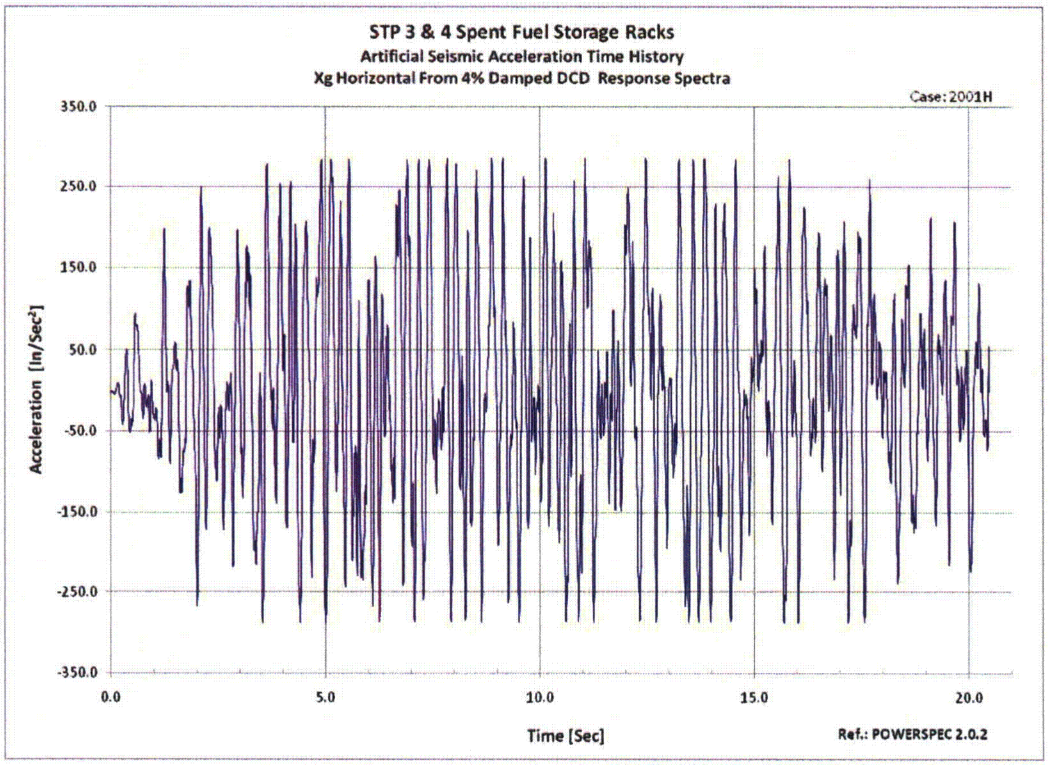

Figure 8: Alternate Method Acceleration Time History – X Direction (Horizontal)

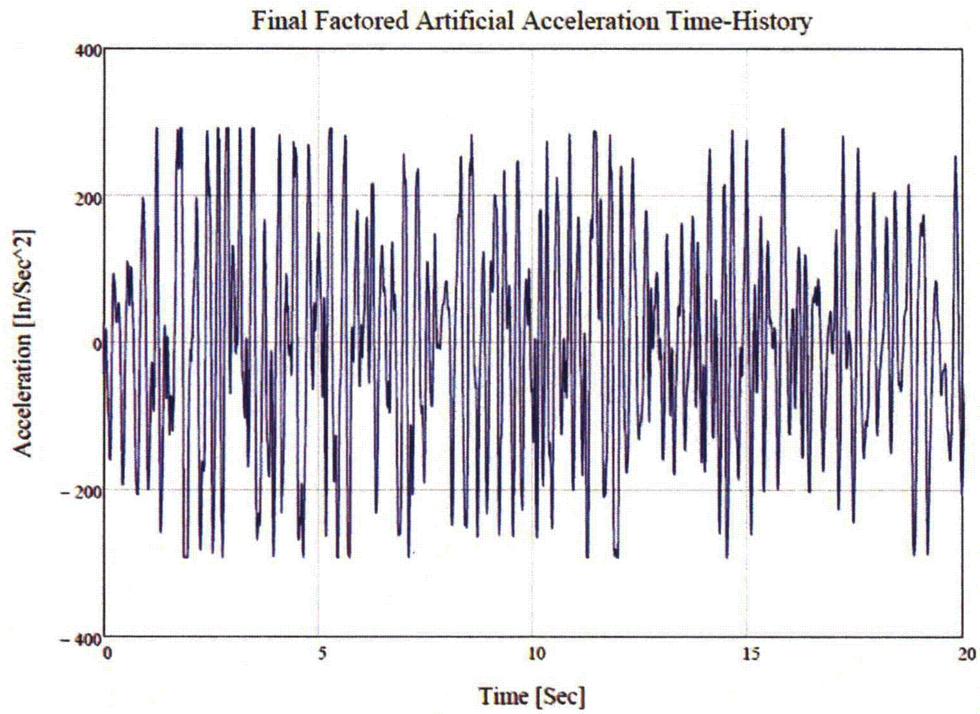

Figure 9: Original Acceleration Time History – Y Direction (Horizontal)

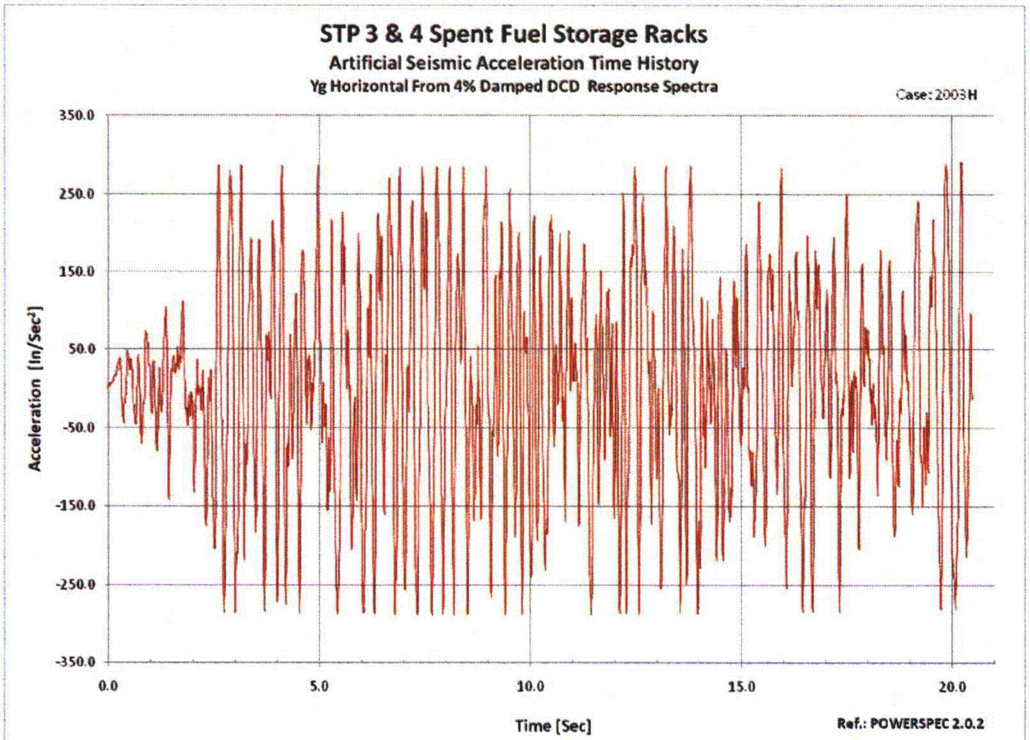

Figure 10: Alternate Method Acceleration Time History – Y Direction (Horizontal)

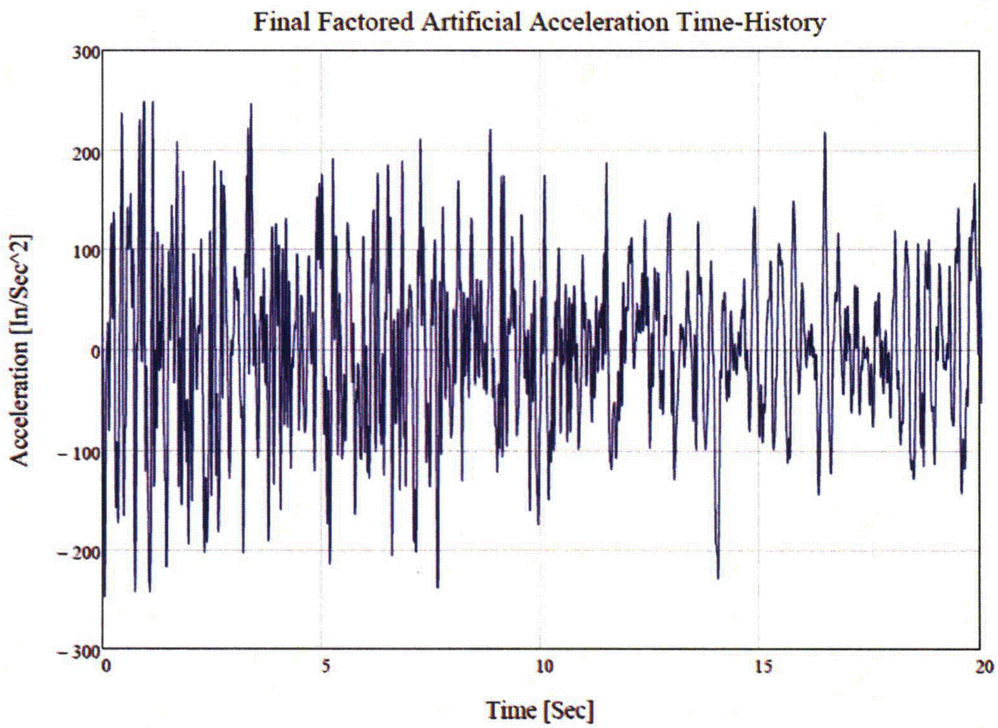

Figure 11: Original Acceleration Time History – Z Direction (Vertical)

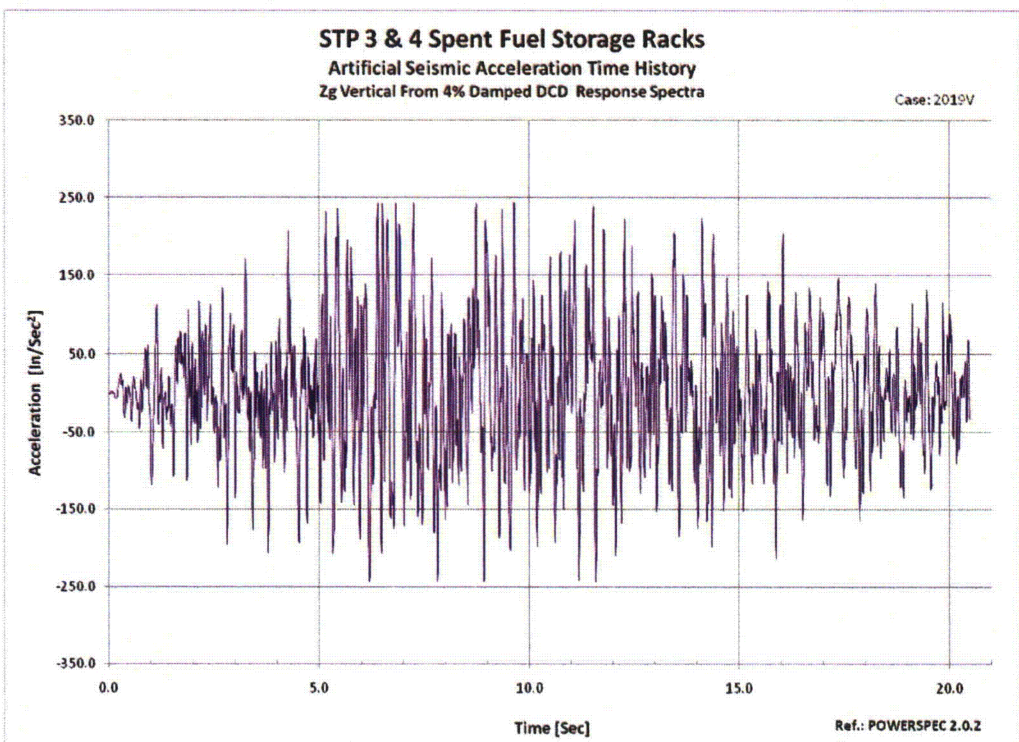

Figure 12: Alternate Method Acceleration Time History – Z Direction (Vertical)

e. Non-baseline corrected acceleration time histories are generally adequate for linear structures without sliding. When a structure is free to slide under the influence of friction, any residual velocity of the ground can impact slippage. To prevent this the acceleration time histories are "baseline corrected" to eliminate residual displacements and velocities. The following baseline correction methodology has been applied at several spent fuel rack installations.

The acceleration time history (A(t)) is double integrated to determine the residual displacement and velocity at the end of the time history (t_f). These residuals are designated Δs_f and Δv_f, respectively. [

]^{a,c}, that are applied to the original acceleration such that the same residuals will be obtained when the acceleration time history is integrated over time. These factors when subtracted from the original acceleration time history will cancel any residual velocity or displacement at the end of the time history. The "baseline corrected" time history A'(t) is:

[

]^{a,c}

Additional details of the development of the "baseline correction" methodology are provided in the supporting calculation note to the spent fuel rack technical report.

ANSYS® software does not have the capability of removing drift from the solution.

f. A discussion and explanation relative to the characteristics as identified in items (1) – (4) are provided below.

(1) The baseline correction procedure applied to the synthesized time histories produces the very low frequency ($f \approx 0.05$ Hz), large 40" displacements. This low frequency, large displacement has no impact on the dynamic response of the fuel racks because:

a. The fuel rack fundamental frequency is >> 0.05 Hz; therefore, the rack does not respond dynamically to this low frequency.
b. The response of the fuel rack is relative to the floor motion, therefore the 40" displacement has no impact on the fuel rack response.
c. The fuel rack dynamic response is due to the high frequency, low amplitude waves superimposed on the low frequency, large displacements shown in Figure 17.
d. As can be seen in the following, the peak acceleration due to the low frequency, large amplitude wave is much smaller than the maximum acceleration of the synthesized acceleration time history of 0.8g as shown in Technical Report Figures 4-2 through 4-4.

$f = 0.05Hz$

$\omega = 2\pi f = 0.314$ rad/sec

$A = \omega^2 Dmax$

$Dmax = 48$ in

$A = 4.737$ in/sec^2

$A = 4.737/386.4 = 0.012$g's

(2, 3 & 4) The magnitudes and phasing of these large displacement low frequency motions in the three application directions is a mathematical idiosyncrasy without any effect on the response of the fuel racks.

The displacements are the double integration of baseline corrected acceleration time histories that satisfy statistical independence criteria. All fuel rack results reported are relative to the floor motion. Figures 13, 14, and 15 show the baseline corrected displacement time histories on a magnified time scale. These figures show that the high frequency displacements in each direction are not in phase and are not a constant ratio of each other. Figure 16 shows a portion of the X motion for the corrected acceleration time history and the corrected displacement time history, which is calculated by double integrating the corrected acceleration time history. The fuel racks dynamically respond to the higher frequency, smaller amplitude cyclic waves shown in these plots. Figure 17 shows Technical Report Figure 4-5 with the data point markers removed.

The comparison between the baseline corrected and alternate displacement time histories (double integration of the synthesized acceleration time histories using the second method described in the response to RAI 09.01.02-9(d)) is shown in Figures 17 and 18, respectively. Figures 17 and 18 both show low frequency, large amplitude displacements containing superimposed high frequency, low amplitude displacements. The fuel racks dynamically respond to the higher frequency smaller amplitude cyclic waves shown in both figures. Figures 19, 20, and 21 show the alternate displacement time history on a magnified time scale for each of the applied directions. Figures 19, 20, and 21 reflect high frequency, low amplitude characteristics that are similar to Figures 13, 14, and 15.

As additional confirmation that the baseline corrected time history is valid, both displacement time histories were applied to a single fuel rack model (a single, stand-alone rack). The maximum fuel impact load, mount impact load, and vertical displacements were calculated and showed excellent comparison, as summarized below:

Result	Displacement Time History	
	Baseline Corrected Design Basis TH	Alternate Time History
Fuel Impact Load	5.4 kips	4.9 kips
Mount Impact Load	162.3 kips	149.5 kips
Vertical Displacement	0.36"	0.36"

For completeness, the maximum horizontal displacements for the baseline corrected time history on the single rack model was calculated to be 6.54", as compared to 9.19" for the alternate time history. Note however that the racks are restrained in the horizontal direction by friction and hydrodynamic mass. Horizontal movement of the racks, both linear sliding and rotation, is determined by the time varying relationship between the total horizontal shear force and the vertical compressive load at each support foot. For different sets of time history motions, the phasing of the horizontal shears and the vertical compressive load can be different. Therefore, different sets of time history motions would be expected to produce different horizontal rack motions. As a result, the variance in the horizontal displacement is neither unexpected nor particularly relevant to the comparison.

Conclusion

The baseline corrected time histories shown in Technical Report Figure 4-5 are developed from three statistically independent synthesized acceleration time histories satisfying all the criteria of SRP 3.7.1. Validation that these time histories are adequate for the fuel rack seismic analysis is demonstrated by comparison with displacement time histories derived from synthesized acceleration time histories using an independent method. Both sets of displacement time histories yielded similar seismic response results when applied to the fuel rack. Therefore, both time histories are equally valid for the fuel rack seismic analysis and it is not necessary to replace the existing time history input.

In summary, the baseline corrected THs were developed with the same methodology as that accepted for the AP1000® PWR, satisfy all the regulatory acceptance criteria, and form the basis for a significant amount of already-completed work.

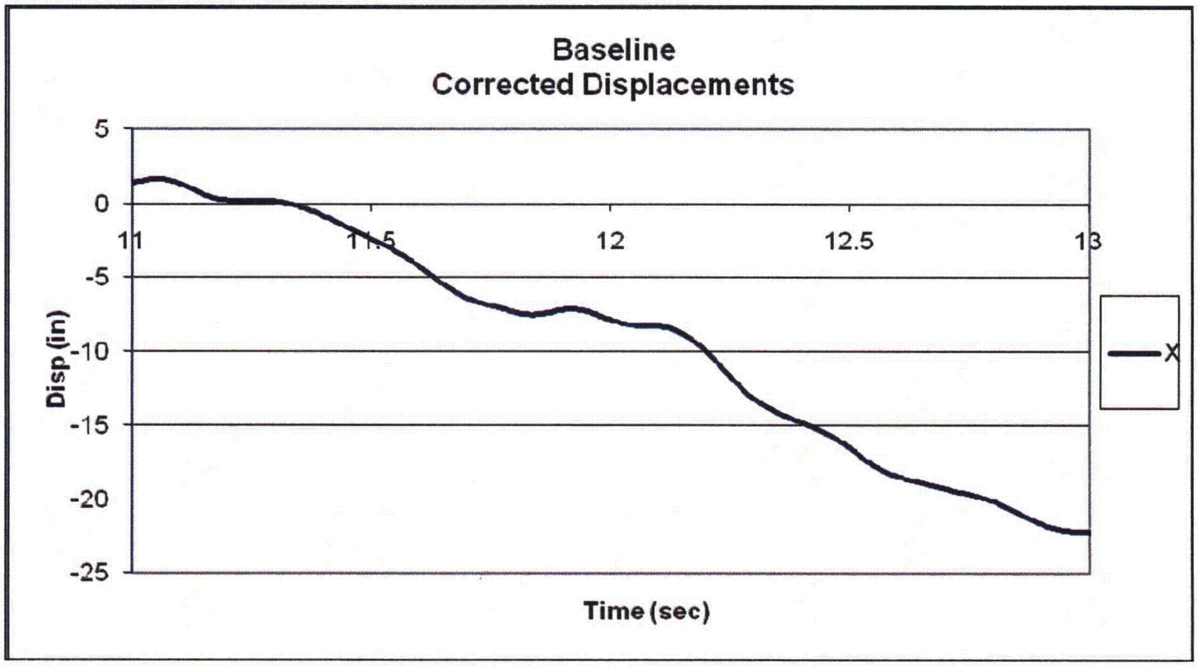

Figure 13: Baseline Corrected X Displacement

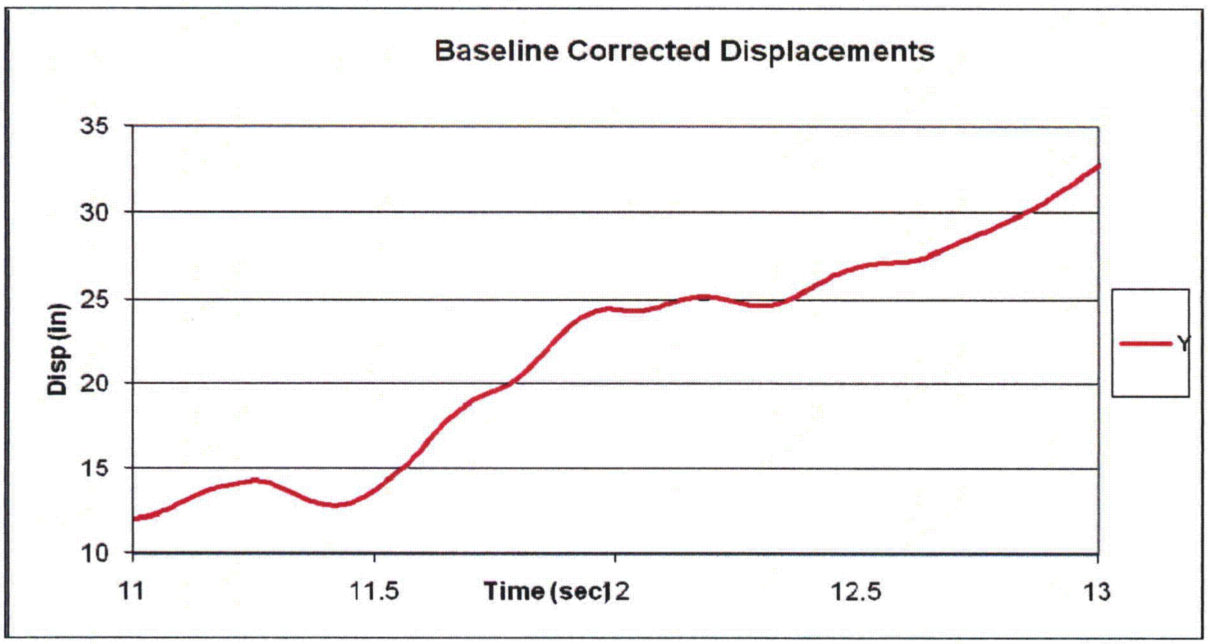

Figure 14: Baseline Corrected Y Displacement

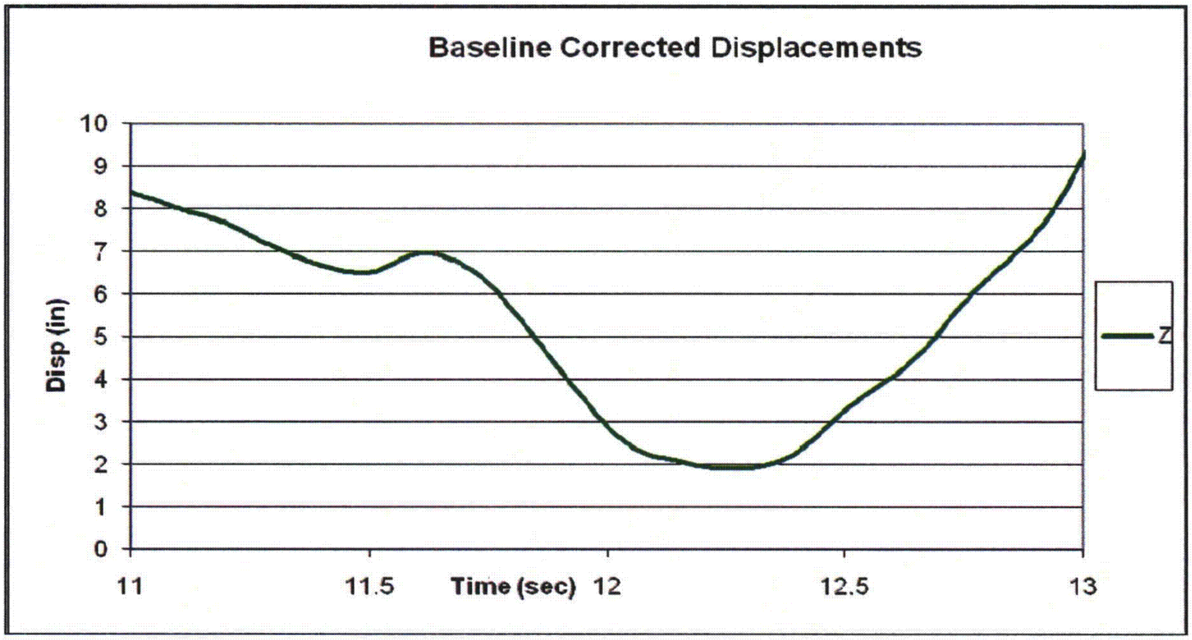

Figure 15: Baseline Corrected Z Displacement

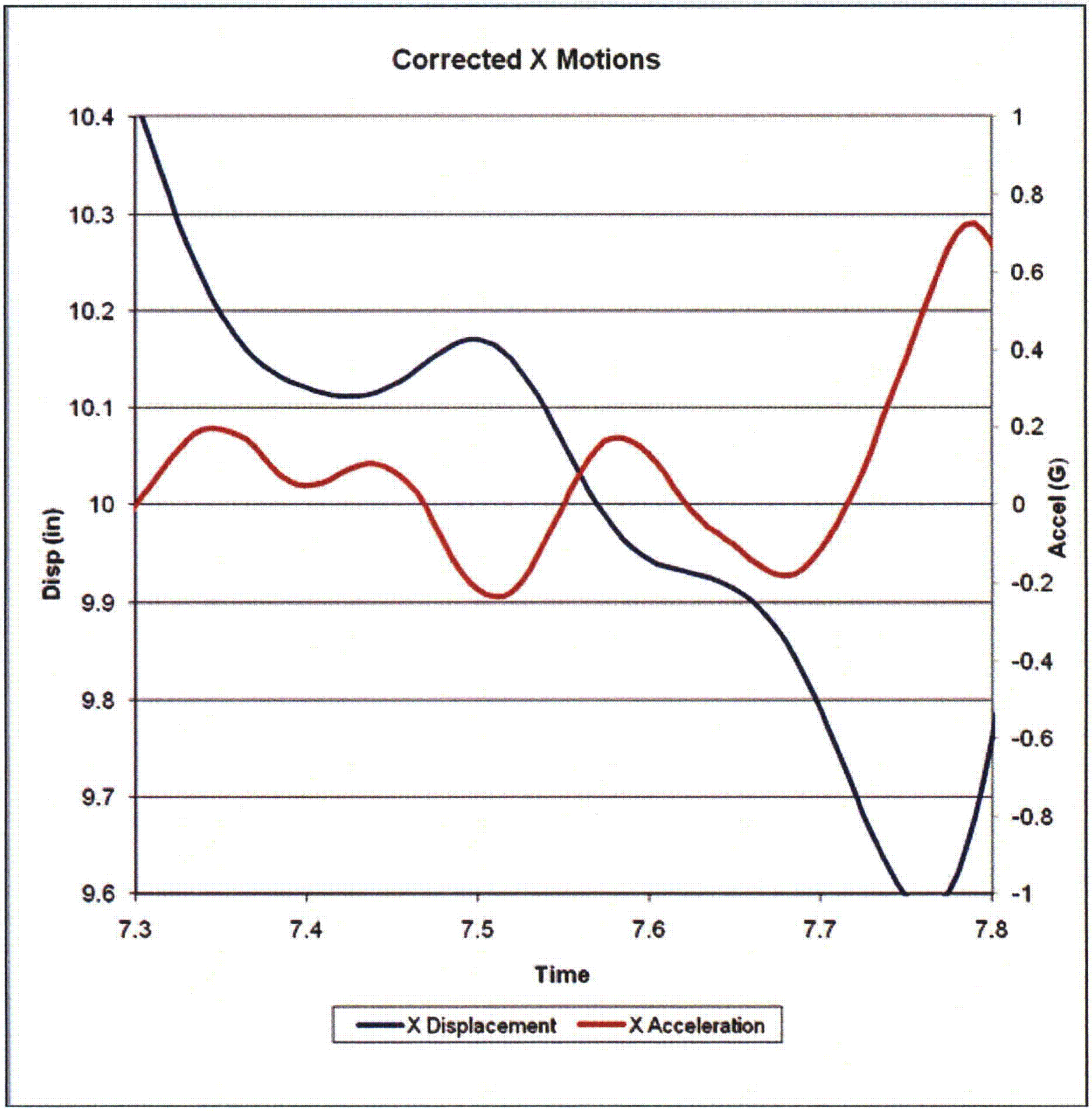

Figure 16: Corrected X Motions

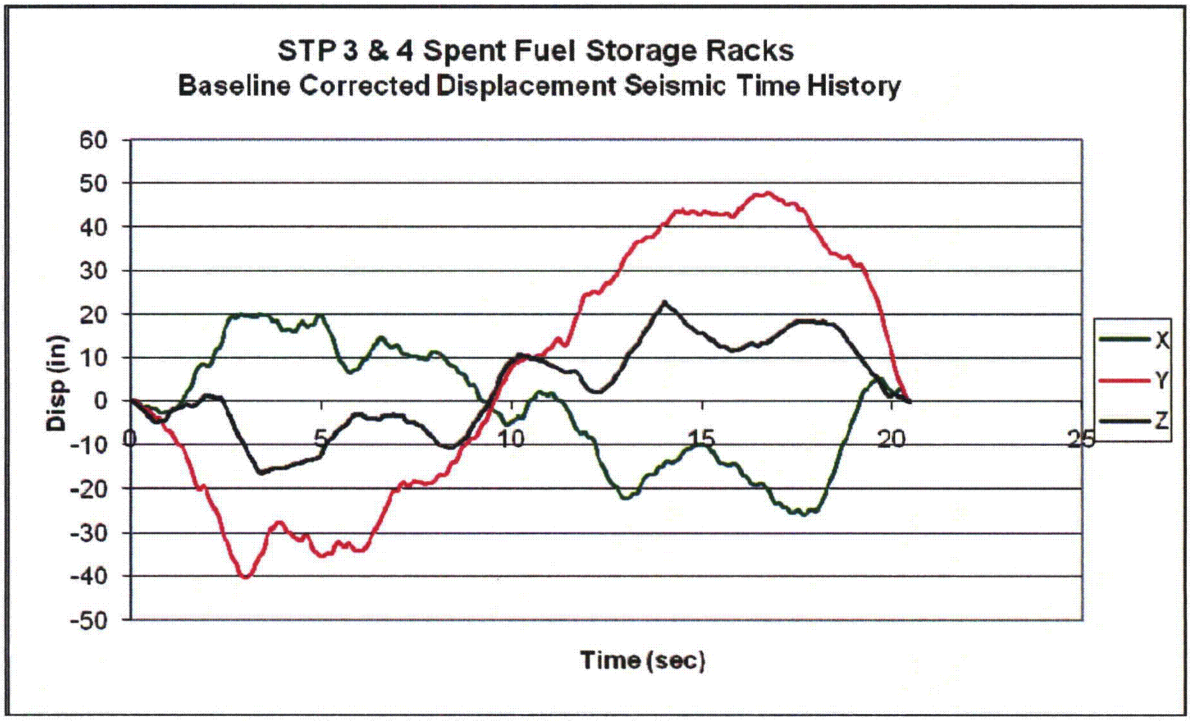

Figure 17: Baseline Corrected Displacement Seismic Time History

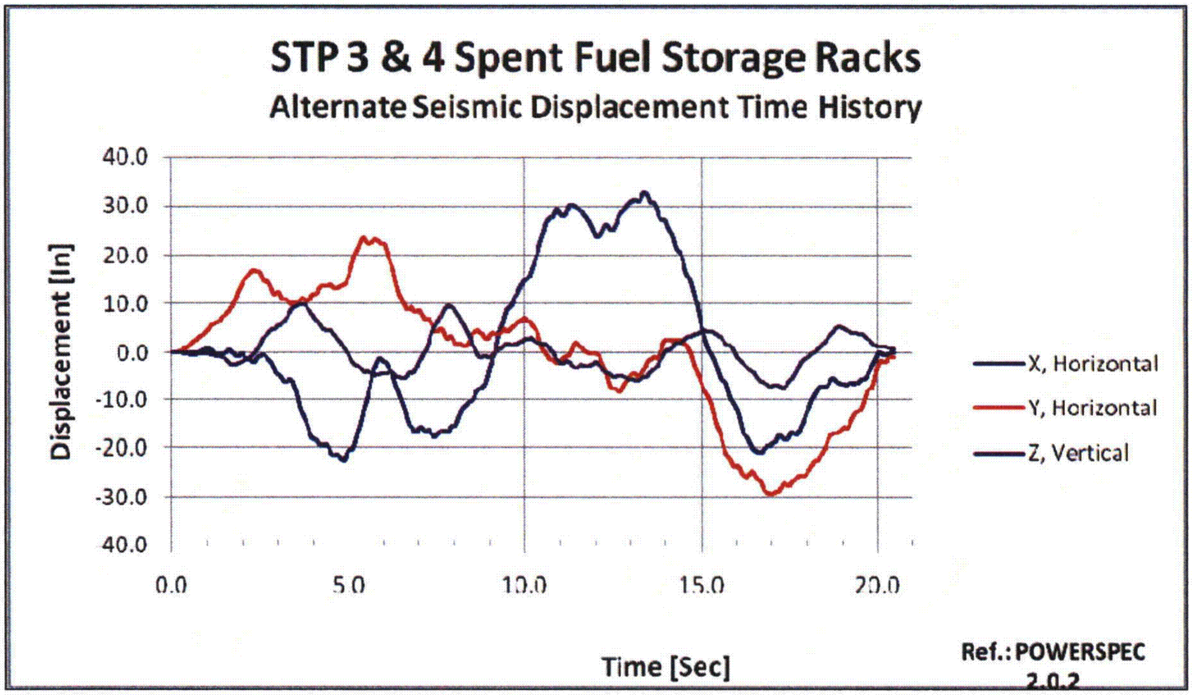

Figure 18: Alternate Displacement Seismic Time History

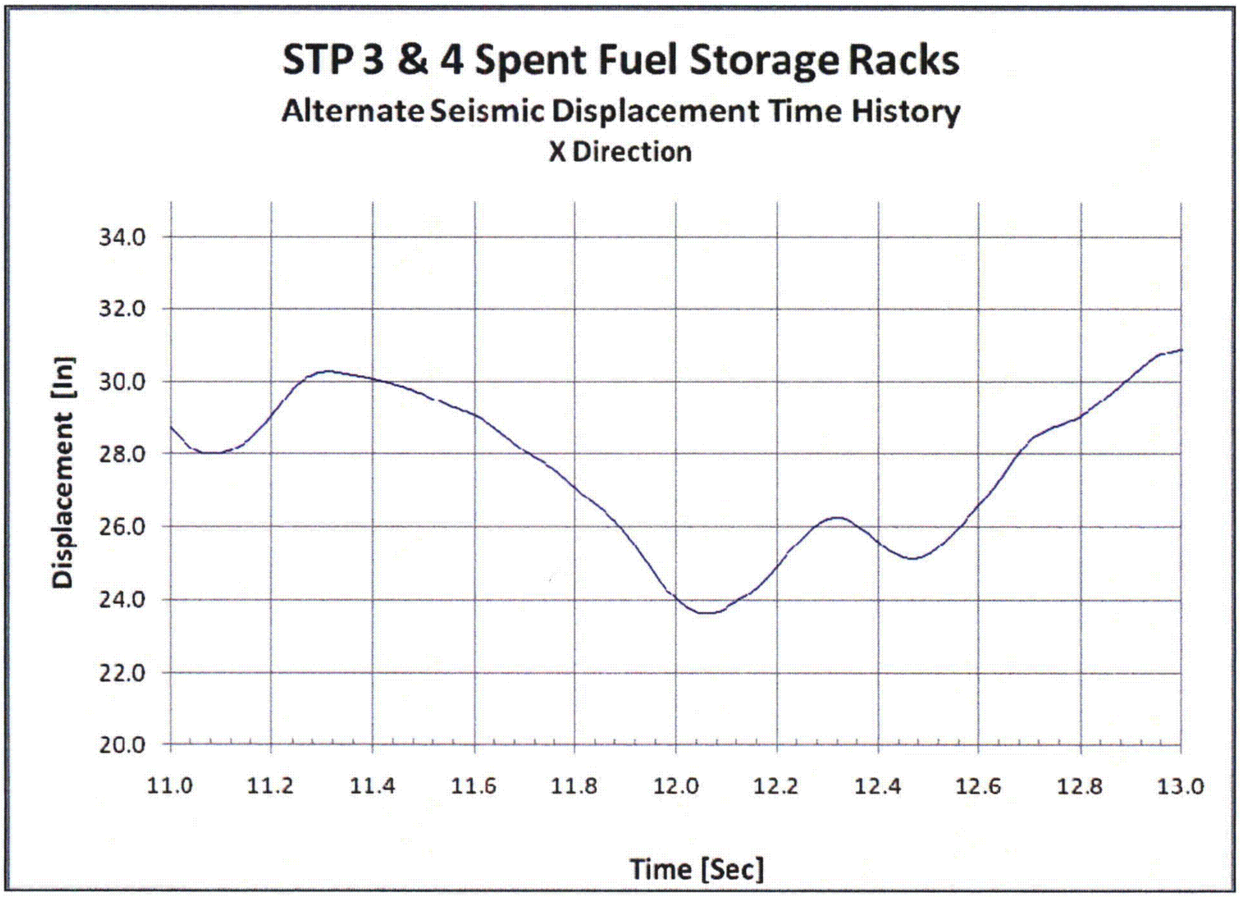

Figure 19: Alternate Displacement Seismic Time History – X Direction

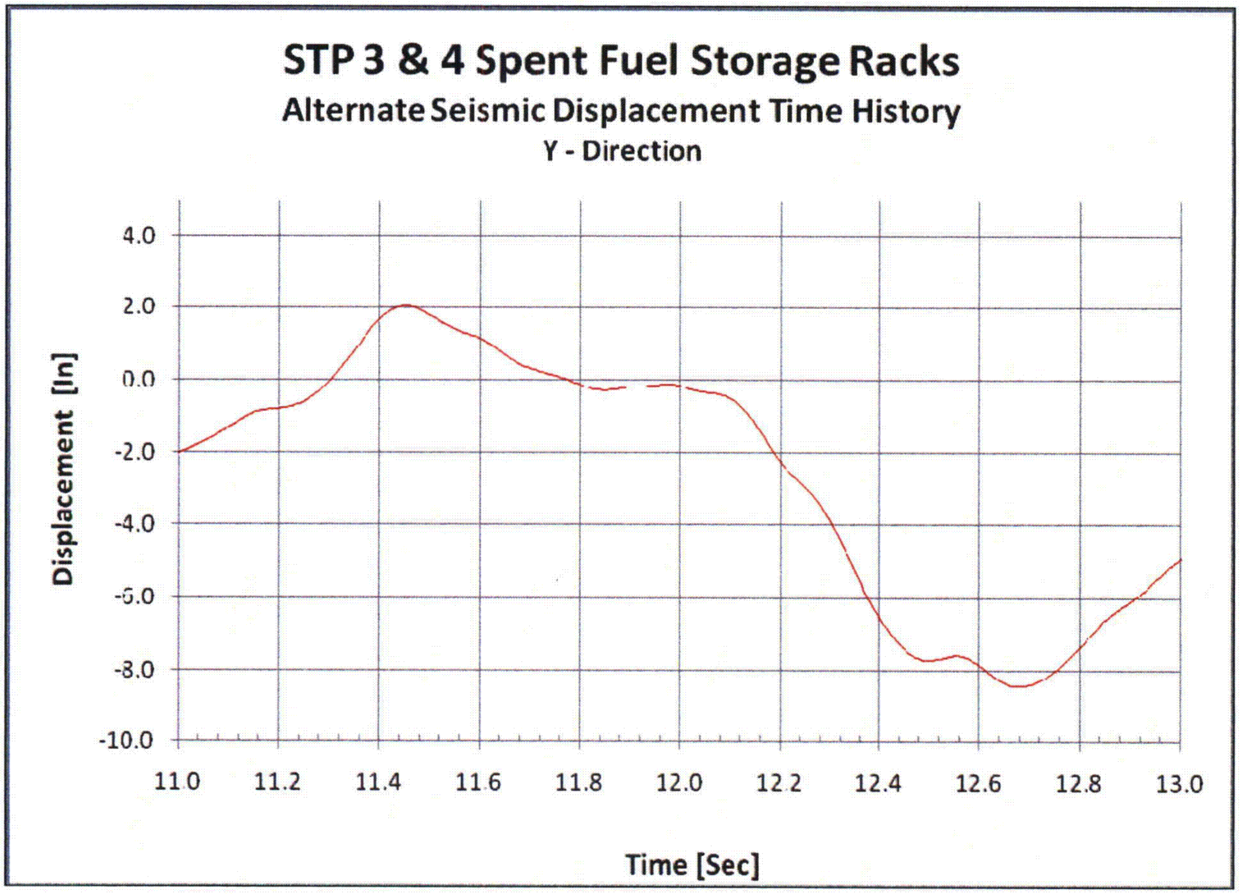

Figure 20: Alternate Displacement Seismic Time History – Y Direction

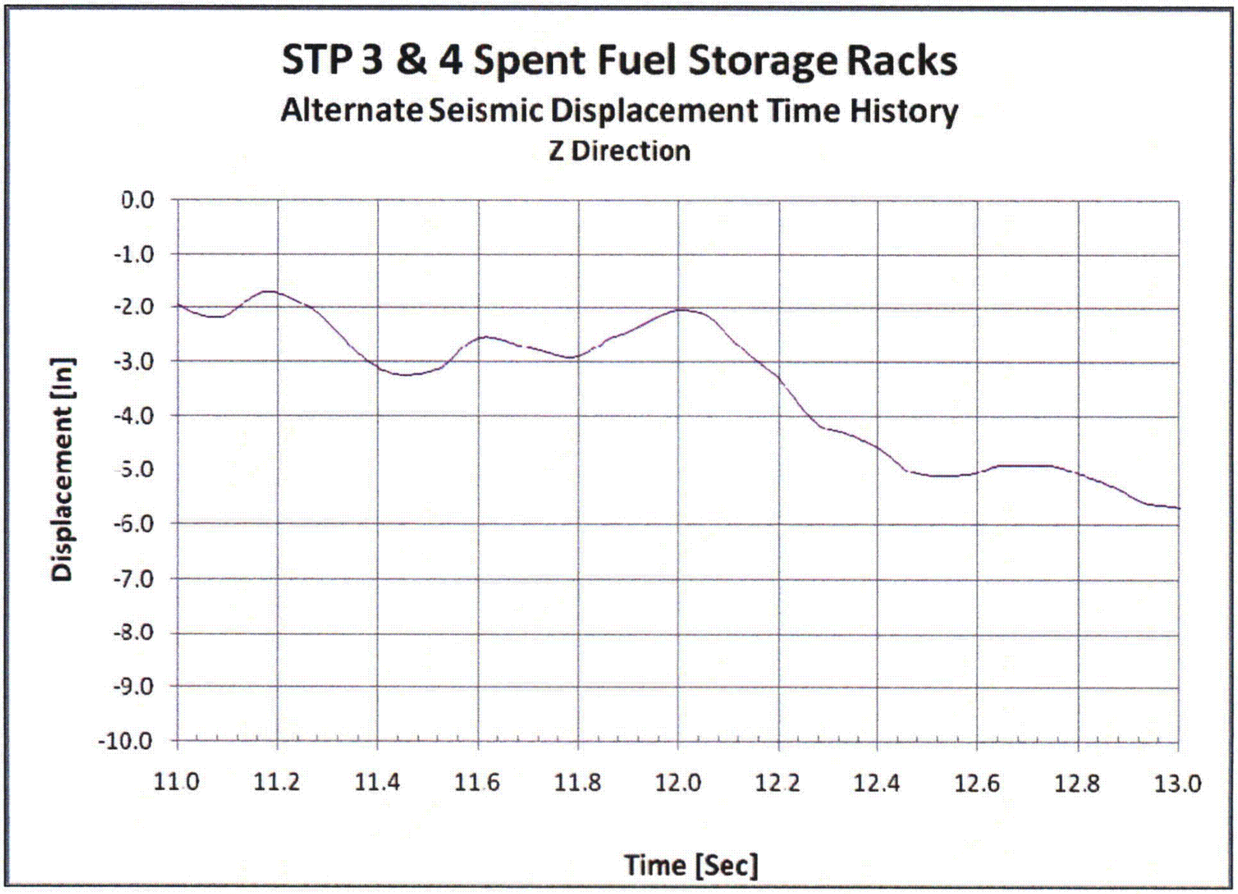

Figure 21: Alternate Displacement Seismic Time History – Z Direction

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

RAI 09.01.02-17

QUESTION:

The staff's review of Westinghouse Electric Company LLC, WCAP-17331-P, Rev. 2, "Structural Analysis Report for STP Units 3 & 4 Spent Fuel Storage Rack Baseline Design" (hereafter referred to as Technical Report), identified several places where clarification and/or editorial correction is needed. The staff requests the applicant to address the following:

1. In Figure 3-5, a "leveling block assembly" and a "leveling pad assembly" are indicated. Explain the difference and provide a picture that clearly shows the difference.

2. The first paragraph of Section 4.1 "Time History Input" states "The base of the spent fuel pool is at 64.96 feet (19.8 meters), and the top of the racks is at 81.36 feet (24.8 meters)." This implies that the racks have a height of 196.8 inches. Explain the difference between this dimension and the "total module height" given in Table 3-2.

3. Figure 4-1 appears to be a plan view. If this is a plan view, then Y is vertical and Z is horizontal west. This is inconsistent with the text in Section 4.1, which defines Y as horizontal west and Z as vertical. Correct the text and figures to be consistent. Also confirm that the seismic input was properly applied in the 3 coordinate directions.

4. In Figure 4-23, it appears that "GZ4" should be "GZ3", to be consistent with Table 4-3. Also, "GZ2" appears twice; correct as necessary to be consistent with Table 4-3. Also, the Z direction is shown as horizontal west; confirm this is correct.

RESPONSE:

The following clarifications and editorial corrections will be incorporated in the next revision of WCAP-17331-P.

1. The two terms "leveling block assembly" and "leveling pad assembly" are synonymous. In Figure 3-5, the "leveling block assembly" referred to the combination of the leveling pad and the leveling screw as discussed in the second paragraph of Section 3. To avoid confusion and provide consistency with the design drawings and components listed in Table 3-3, the second paragraph of Section 3 will be revised to refer to the "leveling pad assembly," reference to the "stiffener plate" will be revised to the "support plate," and Figure 3-5 will be revised as shown below to improve clarity and clearly identify the individual components.

2. The "Total Module Height" given in Table 3-2 and shown on Sketch A-2 is correct. This is the maximum height of the rack with the leveling screw extended. The first paragraph of Section 4.1 will be revised to state, "the base of the spent fuel pool is at 64.96 feet (19.8 meters), and the total module height is provided in Table 3-2."

3. There were two coordinate systems used in the analysis of the Spent Fuel Storage Racks. The seismic inputs coordinate system is as described in the first paragraph of Section 4.1 "Time History Inputs," and is consistent with the time history plots presented in Figures 4-2, 4-3, 4-4, and 4-5. This differs from the coordinate system used by ANSYS® software for the FEM modeling as graphically portrayed on several of the ANSYS® figures. Figure 4-1 will be revised as shown below to clearly indicate the differences between the two systems.

4. Gap "GZ4" as shown on Figure 4-23 will be revised as shown below to indicate "GZ3," which is consistent with Table 4-3. Gap "GZ2" is the small gap between "GX2" and "GX3" as indicated by the arrow. The other reference to "GZ2" will be eliminated. The Z direction as shown is the horizontal west direction. A notation will be added to Figure 4-1 to indicate that this figure uses the coordinate system for the ANSYS® model.

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

a,c

Figure 3-5 Rack Geometry

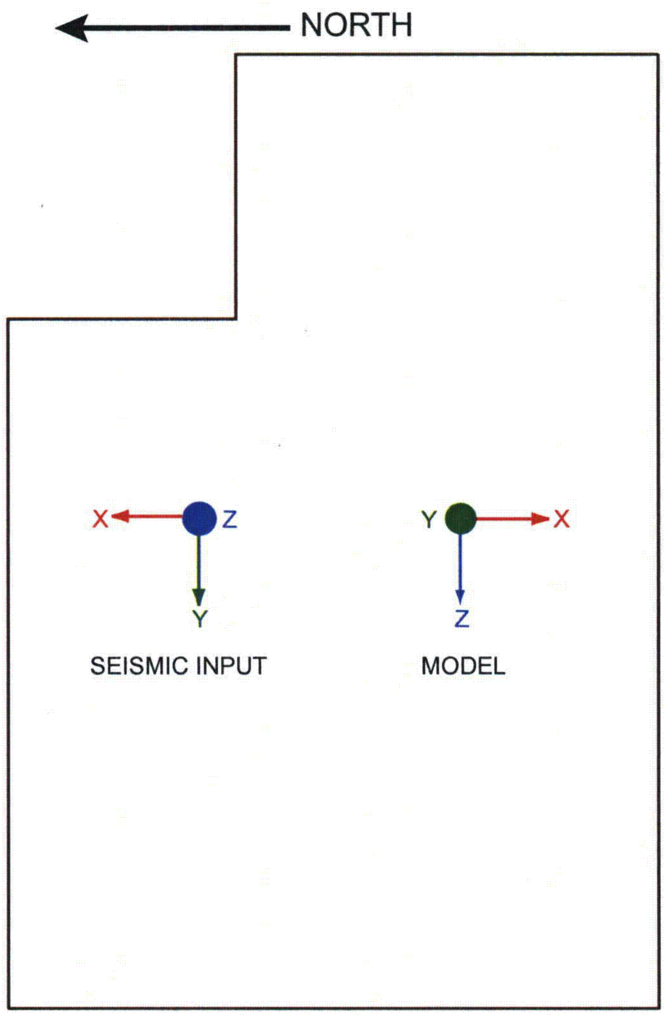

Figure 4-1 Seismic Input and ANSYS® FEM Coordinate Directions

[ ] a,c

Figure 4-23 Rack-to-Pool Wall Gaps

RAI 09.01.02-28

QUESTION:

In RAI 09.01.02-12, the staff noted that, for the design check of the spent fuel storage rack for the stuck fuel assembly load case, the applicant did not develop an allowable maximum weld stress based on the base metal; the staff requested that the applicant provide this information. WCAP-17331-P, Revision 2, Section 8.4.3, page 8-24, now includes a weld design check for base metal shear. During a conference call on 12/21/2011, the applicant indicated that the allowable stress limit for base metal shear used in the calculation is shown in the Technical Report Revision 2, Section 8.4.1; i.e., Fv = 0.3Su. The staff requests the applicant to explain whether the allowable stress limit used complies with ASME Section III Division 1 Section NF-3324.5, which refers to Table NF-3324.5(a)-1 for the allowable stress limits for fillet welds. If not, explain why not, and provide the technical basis for the allowable stress limit used. If yes, explain whether the stress limit of 0.40 x yield stress of base metal for shear stress on base metal was taken into account in the calculation, as required by ASME Section III Division 1 Section NF-3324.5.

RESPONSE:

WCAP-17331-P Revision 2 contains a weld evaluation that qualifies the shear stress on the effective throat of the fillet weld per Table NF-3324.5(a)-1. In response to RAI 09.01.02-12, Westinghouse also added a weld evaluation that qualifies the stresses in the base metal at the interface with the weld material along the leg width of the fillet weld. This latter evaluation is not explicitly defined in Table NF-3324.5(a)-1, but was added to the report because it is the most limiting weld evaluation of the base material. Table NF-3324.5(a)-1 states that the, "shear stress on base metal shall not exceed 0.4 x yield stress (Fy) of base metal", but the shear stress in the base material for this evaluation is very small. The majority of the stress is in the axial direction. The base metal shear evaluation is performed below for the 0.10 inch thick cell wall treating the welds as lines.

Total shear force on weld group

$F_v = 1$ kip

Shear stress on base material at weld group

[ ]^{a,c}

Allowable shear stress in base material

[ ]^{a,c}

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

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-2012-0007

CAW-12-3388

February 7, 2012

APPLICATION FOR WITHHOLDING PROPRIETARY
INFORMATION FROM PUBLIC DISCLOSURE

Subject: WEC-NINA-2012-0007 P-Enclosure, "South Texas Project Units 3 & 4 Responses to RAIs 09.01.02-9 Revision 2, 09.01.02-17, and 09.01.02-28 for WCAP-17331-P" (Proprietary)

The proprietary information for which withholding is being requested in the above-referenced document is further identified in Affidavit CAW-12-3388 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-12-3388 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 7th day of February 2012

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-2012-0007 P-Enclosure, "South Texas Project Units 3 & 4 Responses to RAIs 09.01.02-9 Revision 2, 09.01.02-17, and 09.01.02-28 for WCAP-17331-P" (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 NRC review of the ABWR spent fuel rack structural analysis methodology 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 spent fuel rack structural analysis 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 racks.

(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