

## ArevaEPRDCPEm Resource

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**From:** RYAN Tom (AREVA) [Tom.Ryan@areva.com]  
**Sent:** Monday, June 13, 2011 8:40 AM  
**To:** Tesfaye, Getachew  
**Cc:** BENNETT Kathy (AREVA); DELANO Karen (AREVA); HALLINGER Pat (EXTERNAL AREVA); ROMINE Judy (AREVA); BREDEL Daniel (AREVA); WILLIAMSON Rick (AREVA); WILLIFORD Dennis (AREVA); CORNELL Veronica (EXTERNAL AREVA)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 9  
**Attachments:** RAI 412 Supplement 9 Response US EPR DC.pdf

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively. On January 27, 2011, AREVA NP submitted Supplement 4 to provide a revised schedule for Question 03.07.02-74. On February 11, 2011, AREVA NP submitted Supplement 5 to provide a revised schedule for Question 03.07.02-73. AREVA NP submitted Supplement 6 on March 22, 2011, to provide a revised schedule for Question 03.07.02-74. On May 2, 2011, AREVA NP submitted Supplement 7 to provide a revised schedule for Question 03.07.02-73. AREVA NP submitted Supplement 8 on May 12, 2011, to provide a final response for Question 03.07.02-74.

The attached file, "RAI 412 Supplement 9 Response US EPR DC.pdf" provides a technically correct, complete and final response to Question 03.07.02-73, as committed. Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 412 Question 03.07.02-73.

The following table indicates the respective pages in the response document, "RAI 412 Supplement 9 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 412 — 03.07.02-73	2	15

This concludes the formal AREVA NP response to RAI 412, and there are no questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

*Tom Ryan for*  
**Dennis Williford, P.E.**  
**U.S. EPR Design Certification Licensing Manager**  
**AREVA NP Inc.**

7207 IBM Drive, Mail Code CLT 2B  
Charlotte, NC 28262  
Phone: 704-805-2223  
Email: [Dennis.Williford@areva.com](mailto:Dennis.Williford@areva.com)

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**From:** WELLS Russell (RS/NB)  
**Sent:** Thursday, May 12, 2011 4:32 PM  
**To:** Tesfaye, Getachew

**Cc:** CORNELL Veronica (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 8

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively. On January 27, 2011, AREVA NP submitted Supplement 4 to provide a revised schedule for Question 03.07.02-74. On February 11, 2011, AREVA NP submitted Supplement 5 to provide a revised schedule for Question 03.07.02-73. AREVA NP submitted Supplement 6 on March 22, 2011, to provide a revised schedule for Question 03.07.02-74. On May 2, 2011, AREVA NP submitted Supplement 7 to provide a revised schedule for Question 03.07.02-73.

The attached file, "RAI 412 Supplement 8 Response US EPR DC.pdf" provides a technically correct, complete and final response to Question 03.07.02-74, as committed.

Appended to this file are the affected pages of the U.S. EPR Final Safety Analysis Report in redline-strikeout format which support the response to RAI 412 Question 03.07.02-74.

The following table indicates the respective pages in the response document, "RAI 412 Supplement 8 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 412 — 03.07.02-74	2	25

The schedule for a technically correct and complete response to the remaining question is unchanged and is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	July 1, 2011

*Sincerely,*

*Russ Wells*

*U.S. EPR Design Certification Licensing Manager*

*AREVA NP, Inc.*

*3315 Old Forest Road, P.O. Box 10935*

*Mail Stop OF-57*

*Lynchburg, VA 24506-0935*

*Phone: 434-832-3884 (work)*

*434-942-6375 (cell)*

*Fax: 434-382-3884*

[\*Russell.Wells@Areva.com\*](mailto:Russell.Wells@Areva.com)

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**From:** WELLS Russell (RS/NB)

**Sent:** Monday, May 02, 2011 10:29 AM

**To:** Tesfaye, Getachew

**Cc:** CORNELL Veronica (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 7

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively. On January 27, 2011, AREVA NP submitted Supplement 4 to provide a revised schedule for Question 03.07.02-74. On February 11, 2011, AREVA NP submitted Supplement 5 to provide a revised schedule for Question 03.07.02-73. AREVA NP submitted Supplement 6 on March 22, 2011, to provide a revised schedule for Question 03.07.02-74.

Due to changes in the schedule for FSAR Sections 3.7 and 3.8 as discussed with NRC, the schedule for Question 03.07.02-73 is being revised. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	<b>July 1, 2011</b>
RAI 412 — 03.07.02-74	N/A	May 12, 2011

*Sincerely,*

*Russ Wells*

*U.S. EPR Design Certification Licensing Manager*

*AREVA NP, Inc.*

*3315 Old Forest Road, P.O. Box 10935*

*Mail Stop OF-57*

*Lynchburg, VA 24506-0935*

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*Fax: 434-382-3884*

*[Russell.Wells@Areva.com](mailto:Russell.Wells@Areva.com)*

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**From:** WELLS Russell (RS/NB)

**Sent:** Tuesday, March 22, 2011 5:35 PM

**To:** 'Tesfaye, Getachew'

**Cc:** CORNELL Veronica (External RS/NB); BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 6

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively. On January 27, 2011, AREVA NP submitted Supplement 4 to provide a revised schedule for Question 03.07.02-74. On February 11, 2011, AREVA NP submitted Supplement 5 to provide a revised schedule for Question 03.07.02-73.

The schedule for Question 03.07.02-74 is being revised to allow AREVA NP additional time to address NRC comments. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	May 12, 2011
RAI 412 — 03.07.02-74	N/A	May 12, 2011

Sincerely,

Russ Wells

U.S. EPR Design Certification Licensing Manager

AREVA NP, Inc.

3315 Old Forest Road, P.O. Box 10935

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Lynchburg, VA 24506-0935

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434-942-6375 (cell)

Fax: 434-382-3884

[Russell.Wells@Areva.com](mailto:Russell.Wells@Areva.com)

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**From:** BRYAN Martin (External RS/NB)

**Sent:** Friday, February 11, 2011 3:06 PM

**To:** 'Tesfaye, Getachew'

**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 5

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively. On January 27, 2011, AREVA NP submitted Supplement 4 to provide a revised schedule for Question 03.07.02-74.

The schedule for Question 03.07.02-73 has changed. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	May 12, 2011
RAI 412 — 03.07.02-74	N/A	March 23, 2011

Sincerely,

Martin (Marty) C. Bryan

U.S. EPR Design Certification Licensing Manager

AREVA NP Inc.

Tel: (434) 832-3016

702 561-3528 cell

[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (External RS/NB)  
**Sent:** Thursday, January 27, 2011 11:47 AM  
**To:** 'Tefsaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 4

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 and Supplement 3 on September 15, 2010, and November 15, 2010, respectively.

The schedule for Question 03.07.02-74 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	February 17, 2011
RAI 412 — 03.07.02-74	N/A	March 23, 2011

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

---

**From:** BRYAN Martin (External RS/NB)  
**Sent:** Monday, November 15, 2010 4:45 PM  
**To:** 'Tefsaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB); 'Miernicki, Michael'  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 3

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73. AREVA NP submitted a revised schedule for Question 03.07.02-74 in Supplement 2 on September 15, 2010.

The schedule for Question 03.07.02-74 is being revised to allow additional time for AREVA NP to address NRC comments. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
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RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	February 17, 2011
RAI 412 — 03.07.02-74	N/A	January 28, 2011

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

---

**From:** BRYAN Martin (External RS/NB)  
**Sent:** Wednesday, September 15, 2010 9:42 AM  
**To:** 'Tsfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 2

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010. On August 27, 2010, AREVA NP submitted Supplement 1 to provide an INTERIM response to Question 03.07.02-73.

The schedule for Question 03.07.02-74 is being revised to allow additional time for AREVA NP to interact with the NRC. The schedule for the remaining question is unchanged.

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual)	February 17, 2011
RAI 412 — 03.07.02-74	N/A	December 13, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

---

**From:** BRYAN Martin (External RS/NB)  
**Sent:** Friday, August 27, 2010 5:13 PM  
**To:** 'Tsfaye, Getachew'  
**Cc:** DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); CORNELL Veronica (External RS/NB)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 1-INTERIM

Getachew,

AREVA NP Inc. (AREVA NP) provided a schedule for a technically correct and complete response to RAI 412 on June 24, 2010.

The attached file, "RAI 412 Supplement 1 Response US EPR DC - INTERIM.pdf" provides a technically correct and complete INTERIM response to 1 of the remaining 2 questions, as committed.

The following table indicates the respective pages in the response document, "RAI 412 Supplement 1 Response US EPR DC- INTERIM.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 412 — 03.07.02-73	2	2

The schedule for a technically correct and complete response to the remaining questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010 (Actual- August 27, 2010)	February 17, 2011
RAI 412 — 03.07.02-74	N/A	September 20, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

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**From:** BRYAN Martin (EXT)  
**Sent:** Thursday, June 24, 2010 2:00 PM  
**To:** 'Tesfaye, Getachew'  
**Cc:** DELANO Karen V (AREVA NP INC); ROMINE Judy (AREVA NP INC); BENNETT Kathy A (OFR) (AREVA NP INC); VAN NOY Mark (EXT); CORNELL Veronica (EXT); RYAN Tom (AREVA NP INC); GARDNER George Darrell (AREVA NP INC)  
**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 412 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 2 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 412 Response US EPR DC.pdf" that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 412 — 03.07.02-73	2	2
RAI 412 — 03.07.02-74	3	3

A complete answer is not provided for 2 of the 2 questions. The dates provide are based upon the civil/structural re-planning activities and revised RAI response schedule presented to the NRC during the June 9, 2010, Public Meeting, and to allow time to interact with the NRC on the responses.

Prior to submittal of the final RAI response, AREVA NP will provide an interim RAI response that includes:

- (1) a description of the technical work (e.g., methodology)
- (2) U.S. EPR FSAR revised pages, as applicable

The schedule for a technically correct and complete response to these questions is provided below.

Question #	Interim Response Date	Response Date
RAI 412 — 03.07.02-73	August 29, 2010	February 17, 2011
RAI 412 — 03.07.02-74	N/A	September 20, 2010

Sincerely,

Martin (Marty) C. Bryan  
U.S. EPR Design Certification Licensing Manager  
AREVA NP Inc.  
Tel: (434) 832-3016  
702 561-3528 cell  
[Martin.Bryan.ext@areva.com](mailto:Martin.Bryan.ext@areva.com)

---

**From:** Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]  
**Sent:** Friday, May 28, 2010 8:11 AM  
**To:** ZZ-DL-A-USEPR-DL  
**Cc:** Chakravorty, Manas; Hawkins, Kimberly; Miernicki, Michael; Patel, Jay; Colaccino, Joseph; ArevaEPRDCPEm Resource  
**Subject:** U.S. EPR Design Certification Application RAI No. 412(4744), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 25, 2010, and on May 27, 2010, you informed us that the RAI is clear and no further clarification is needed. As a result, no change is made to the draft RAI. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,  
Getachew Tesfaye  
Sr. Project Manager  
NRO/DNRL/NARP  
(301) 415-3361

**Hearing Identifier:** AREVA\_EPR\_DC\_RAIs  
**Email Number:** 3114

**Mail Envelope Properties** (8D609EE2F807714CBF5297D9BA8602FB012EEEEAD)

**Subject:** Response to U.S. EPR Design Certification Application RAI No. 412, FSAR Ch. 3, Supplement 9  
**Sent Date:** 6/13/2011 8:39:56 AM  
**Received Date:** 6/13/2011 8:40:09 AM  
**From:** RYAN Tom (AREVA)

**Created By:** Tom.Ryan@areva.com

**Recipients:**

"BENNETT Kathy (AREVA)" <Kathy.Bennett@areva.com>

Tracking Status: None

"DELANO Karen (AREVA)" <Karen.Delano@areva.com>

Tracking Status: None

"HALLINGER Pat (EXTERNAL AREVA)" <Pat.Hallinger.ext@areva.com>

Tracking Status: None

"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>

Tracking Status: None

"BREDEL Daniel (AREVA)" <Daniel.Bredel@areva.com>

Tracking Status: None

"WILLIAMSON Rick (AREVA)" <Rick.Williamson@areva.com>

Tracking Status: None

"WILLIFORD Dennis (AREVA)" <Dennis.Williford@areva.com>

Tracking Status: None

"CORNELL Veronica (EXTERNAL AREVA)" <Veronica.Cornell.ext@areva.com>

Tracking Status: None

"Tesfaye, Getachew" <Getachew.Tesfaye@nrc.gov>

Tracking Status: None

**Post Office:** AUSLYNCMX02.adom.ad.corp

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
MESSAGE	18678	6/13/2011 8:40:09 AM
RAI_412_Supplement_9_Response_US_EPR_DC.pdf		922742

**Options**

**Priority:** Standard

**Return Notification:** No

**Reply Requested:** No

**Sensitivity:** Normal

**Expiration Date:**

**Recipients Received:**

**Response to  
Request for Additional Information No. 412(4744), Revision 0,  
Supplement 9**

**5/28/2010**

**U.S. EPR Standard Design Certification  
AREVA NP Inc.  
Docket No. 52-020  
SRP Section: 03.07.02 - Seismic System Analysis  
Application Section: 03.07.02**

**QUESTIONS for Structural Engineering Branch 2 (ESBWR/ABWR Projects) (SEB2)**

**Question 03.07.02-73:****RAI from Audit, 4/26-30, 2010**

During the staff review of the calculation documenting the SSI Analysis of the Nuclear Island (NI) Common Basemat Structure (Calculation No.32-7002884-000), there were two items identified which require further clarification to assure that the design of the NI meets the earthquake design requirements of GDC 2. First, it was noted that pressure distributions on the shear key (see example on page 419) appear to be oscillatory and somewhat random. AREVA is requested to describe how the distribution was determined, whether or not it is valid, and if valid, how this pressure distribution will be used for earthquake design of the shear key and for the calculation of interface loads between the shear key and the NI foundation mat.

Second, many of the transfer functions such as those on page 696 of the calculation exhibit spikes. AREVA is requested to describe the cause of these spikes and to quantify the impact these spikes have on the stability of the computed seismic response of the NI structure.

**Response to Question 03.07.02-73:**Item 1:

Shear key plots were developed and provide the maximum pressure distribution that considers the entire earthquake time history. Figure 03.07.02-73-1 represents the pressures on the shear key that occur at different times during the earthquake, and can subsequently have a pattern that appears oscillatory and random. However, the pressure distribution at a specific time reveals that the pressure distribution is more uniform, with about half of the shear key resisting compressive forces, and the other half resisting tensile forces. Figure 03.07.02-73-2 shows the pressure distribution at different elevations of the shear key for the instant of time that the maximum pressure occurs for that elevation. Figure 03.07.02-73-3 provides the stress distribution for  $z = -16.040$  m from Figure 03.07.02-73-1.

The shear key (tendon gallery) is integral with the Nuclear Island (NI) Common Basemat. The shear key is designed based on the results from the soil-structure interaction (SSI) analysis, the NI stability analysis and 3D finite element model (FEM) NI Basemat Foundation Model described in RAI 371, Question 03.07.02-66.

Item 2:

The transfer function values are calculated by MTR/SASSI at user-specified frequencies. Values at other frequencies are determined by the MTR/SASSI interpolation scheme.

The impact of transfer function spikes on the stability of the computed seismic response was assessed in a case study for soil case 2sn4ue. Soil case 2sn4ue, for uncracked concrete, was evaluated because it has significant seismic response and transfer function spikes. A total of 65 computed frequencies ranging from 0.1 Hz to 50 Hz represent the existing analysis for soil case 2sn4ue. An additional 124 computed frequencies were combined with the 65 frequencies for a total of 189 computed frequencies ranging from 0.1 Hz to 50 Hz. Figures 03.07.02-73-4 and 03.07.02-73-5 show the computed frequencies for the existing analysis and the case study.

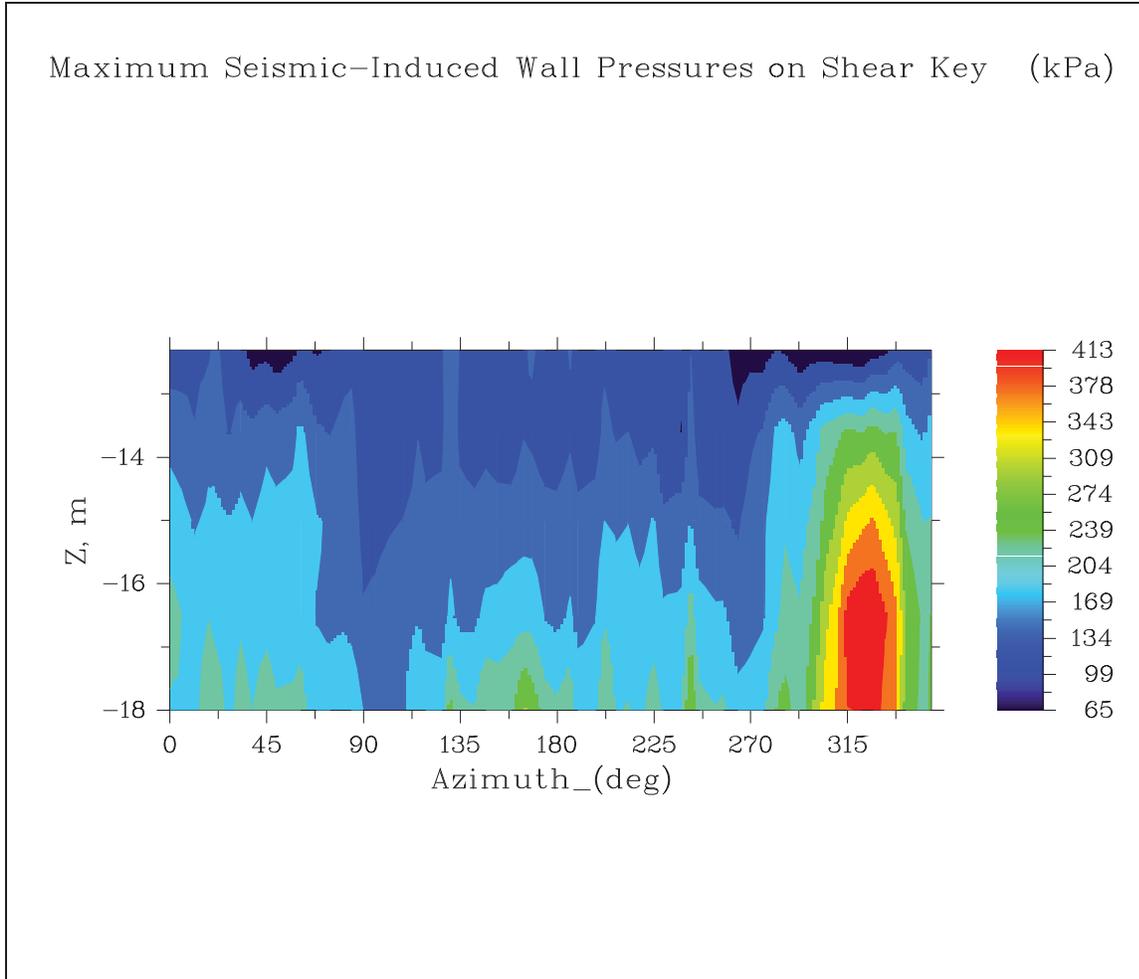
Computed results of transfer functions and in-structure response spectra (ISRS) are compared before and after the addition of computed frequencies at two locations on the NI FEM model. Figures 03.07.02-73-6(a), (b) and (c) show the transfer functions in the X-direction due to motion in the X, Y and Z directions, respectively from the two solutions at node 39721. Node 39721 corresponds to Elevation 21m in Safeguard Building 1. Figure 03.07.02-73-7 shows the comparison of the ISRS from the two solutions at node 39721 in the X-direction. Figures 03.07.02-73-8(a), (b) and (c) show the transfer functions in the Y-direction due to motion in the Y, X and Z directions, respectively at node 33720. Node 33720 corresponds to elevation 15.4m in Safeguard Buildings 2 and 3. Figure 03.07.02-73-9 shows the comparison of the ISRS from the two solutions at node 33720 in the Y-direction.

Comparison of ISRS shows that the removal of transfer function spikes does not significantly change the ISRS. Therefore, the transfer function spikes are attributed to the interpolation scheme and the computed seismic response of the NI structure is stable.

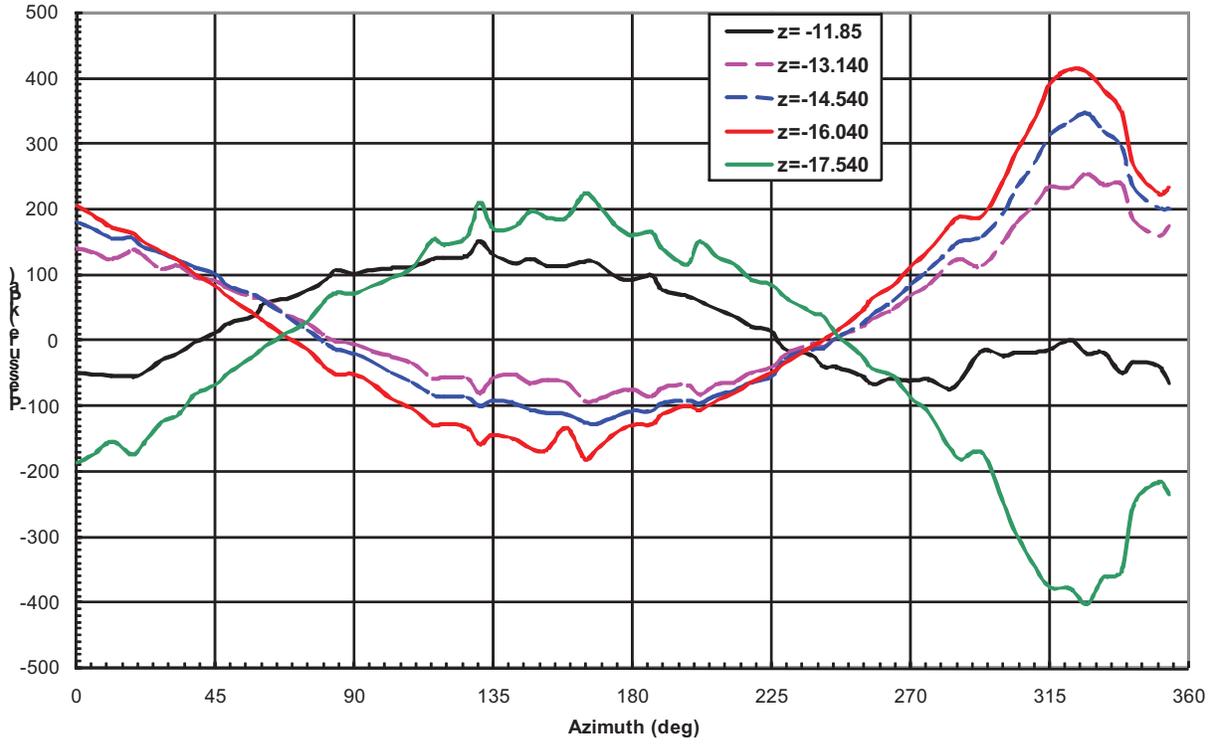
**FSAR Impact:**

The U.S. EPR FSAR will not be changed as a result of this question.

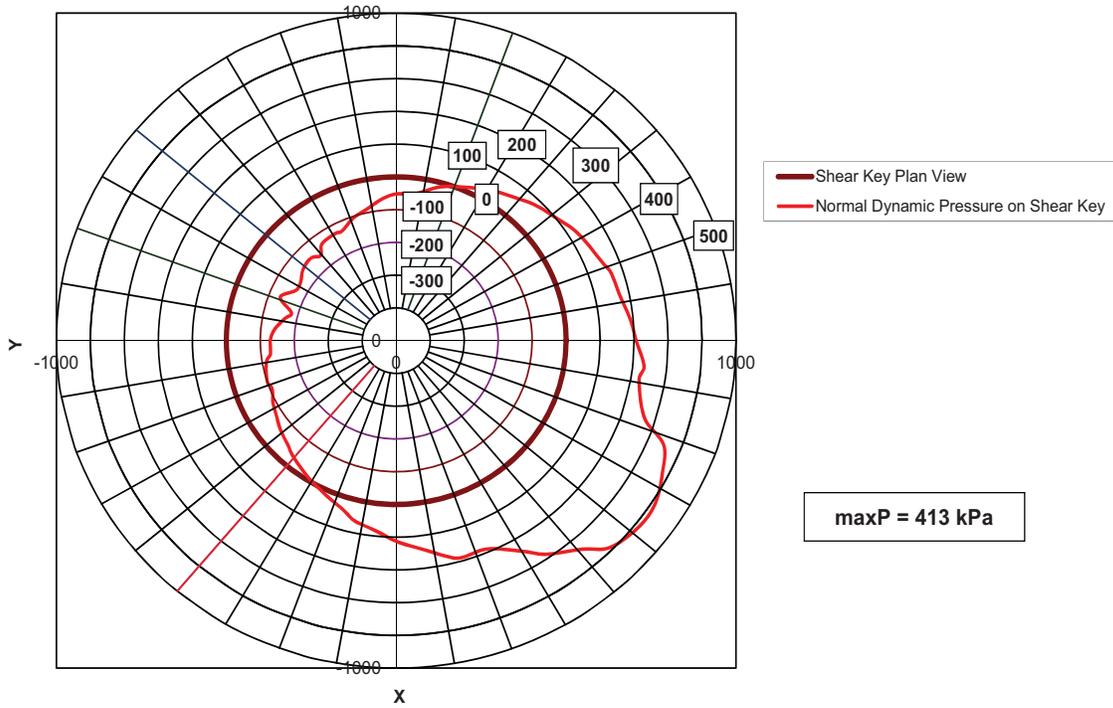
**Figure 03.07.02-73-1—Contours of Computed Maximum Normal Dynamic Soil Pressures on Shear Key Outer Sidewall Surface, Analysis Case 2sn4ue-m**



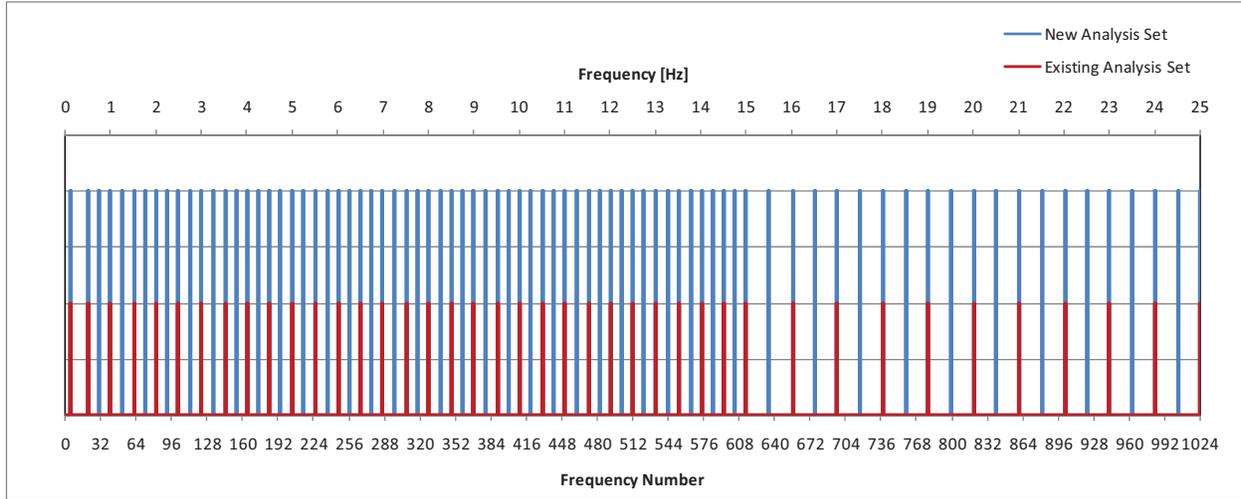
**Figure 03.07.02-73-2—Circumferential Profiles of Instantaneous Normal Dynamic Soil Pressures on Shear Key Sidewall at Different Horizontal Sections at Time of Maximum Pressure on Respective Section, Cracked Concrete Model, Analysis Case 2sn4ue-m**



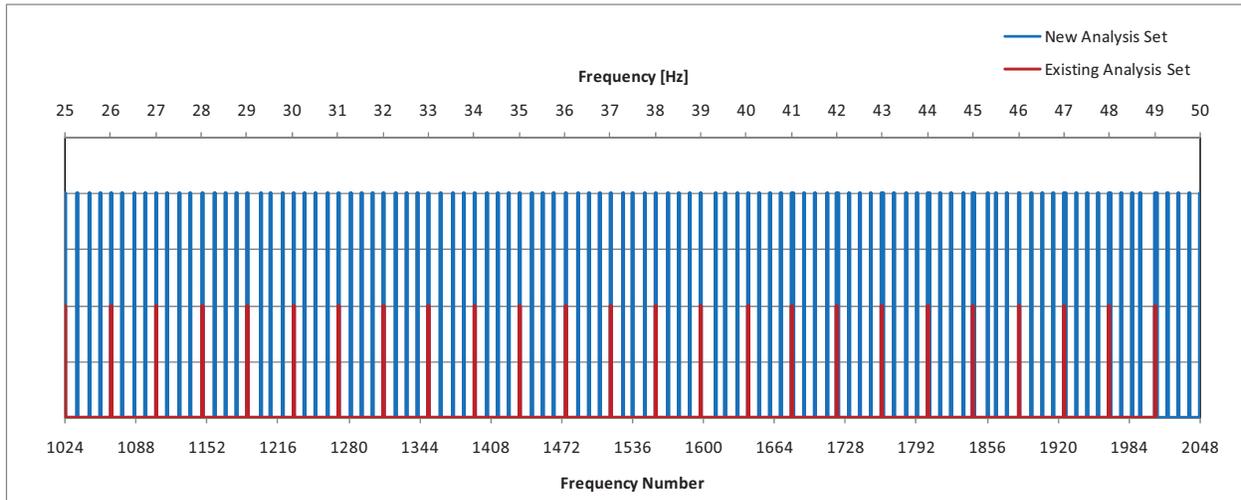
**Figure 03.07.02-73-3—Distribution of Normal Dynamic Soil Pressures (kPa) on Shear Key Outer wall Horizontal Section at z = -16.040 m at time of Maximum Pressure on this section (t = 4.68 s), Cracked Concrete Model, Analysis Case 2sn4ue-m**



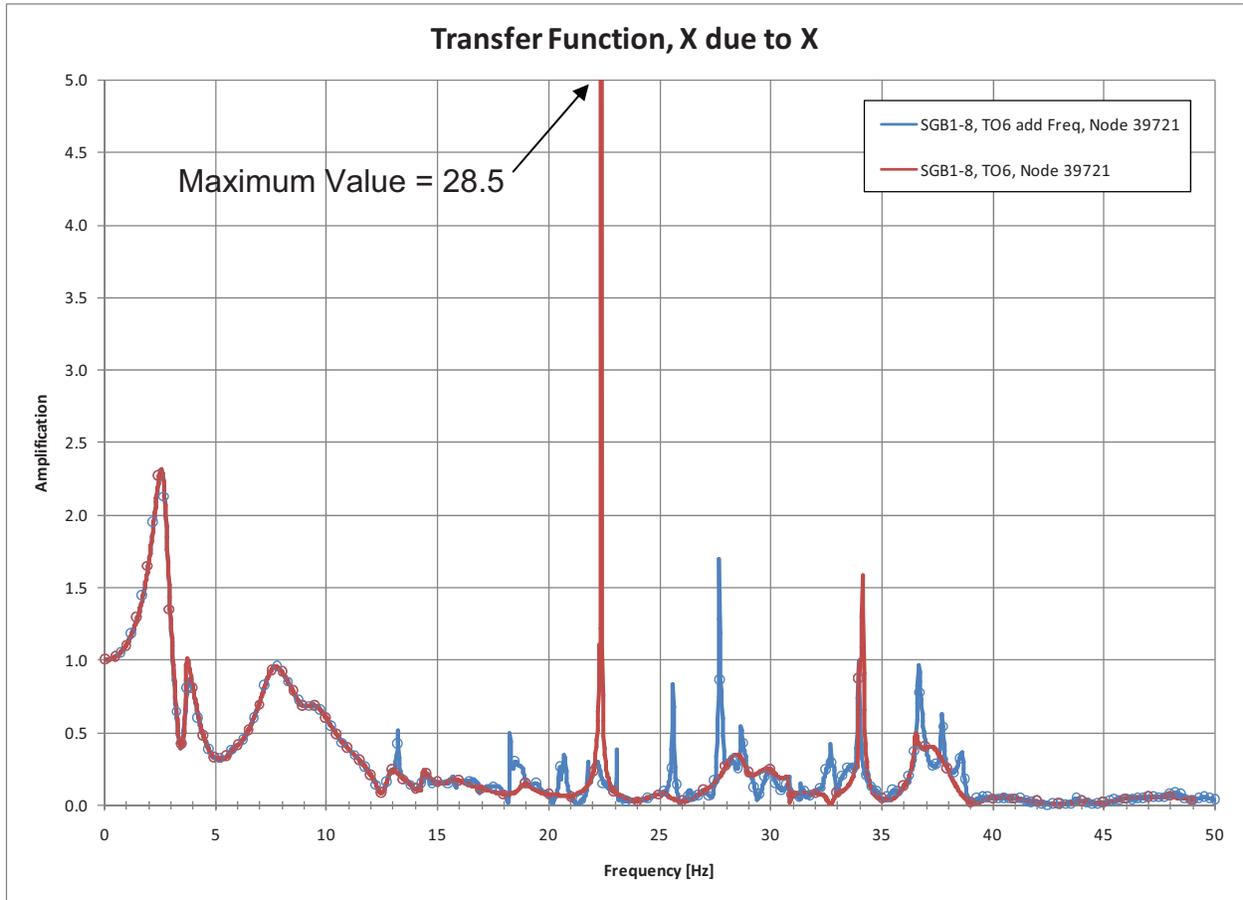
**Figure 03.07.02-73-4—Analysis Frequencies 0.1 Hz to 25 Hz**



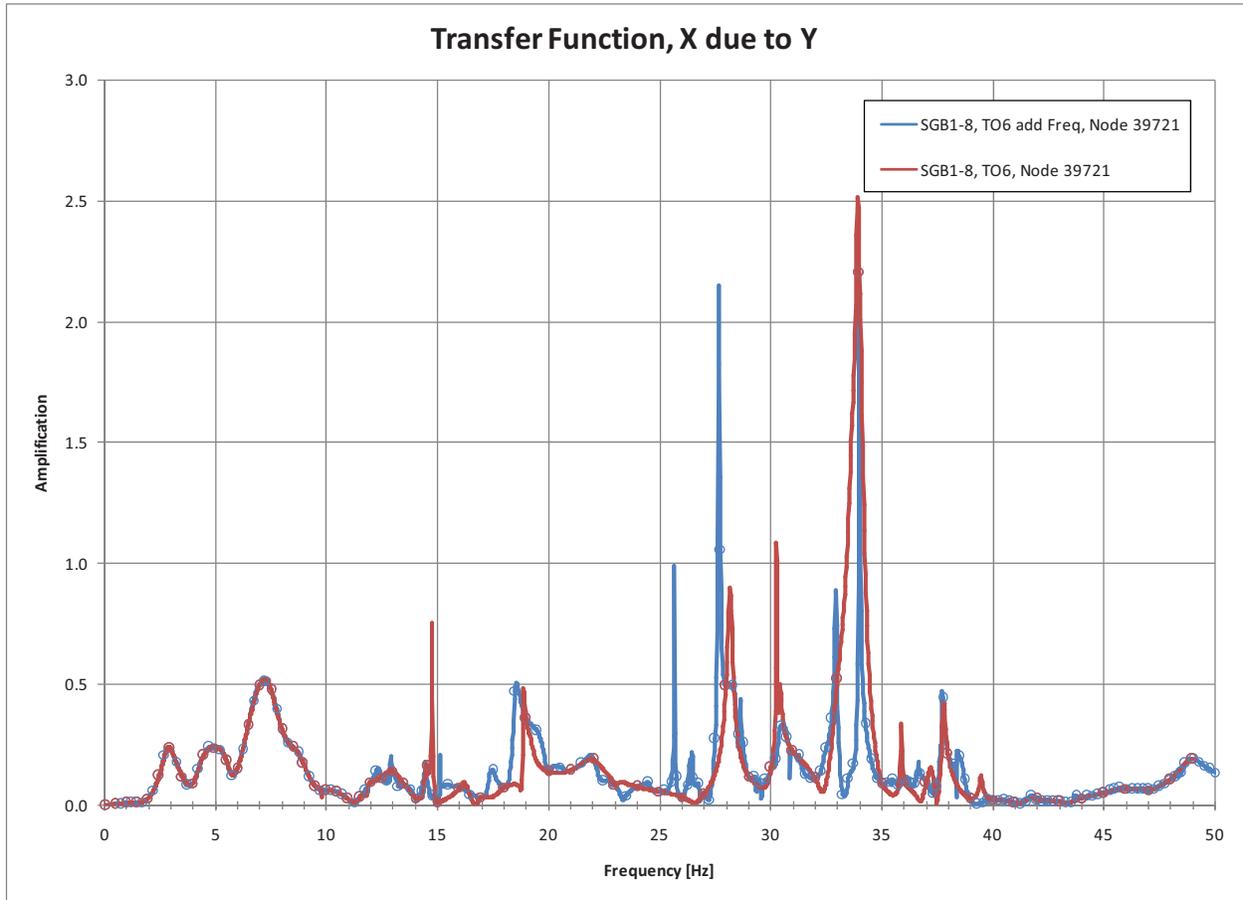
**Figure 03.07.02-73-5—Analysis Frequencies 25 Hz to 50 Hz**



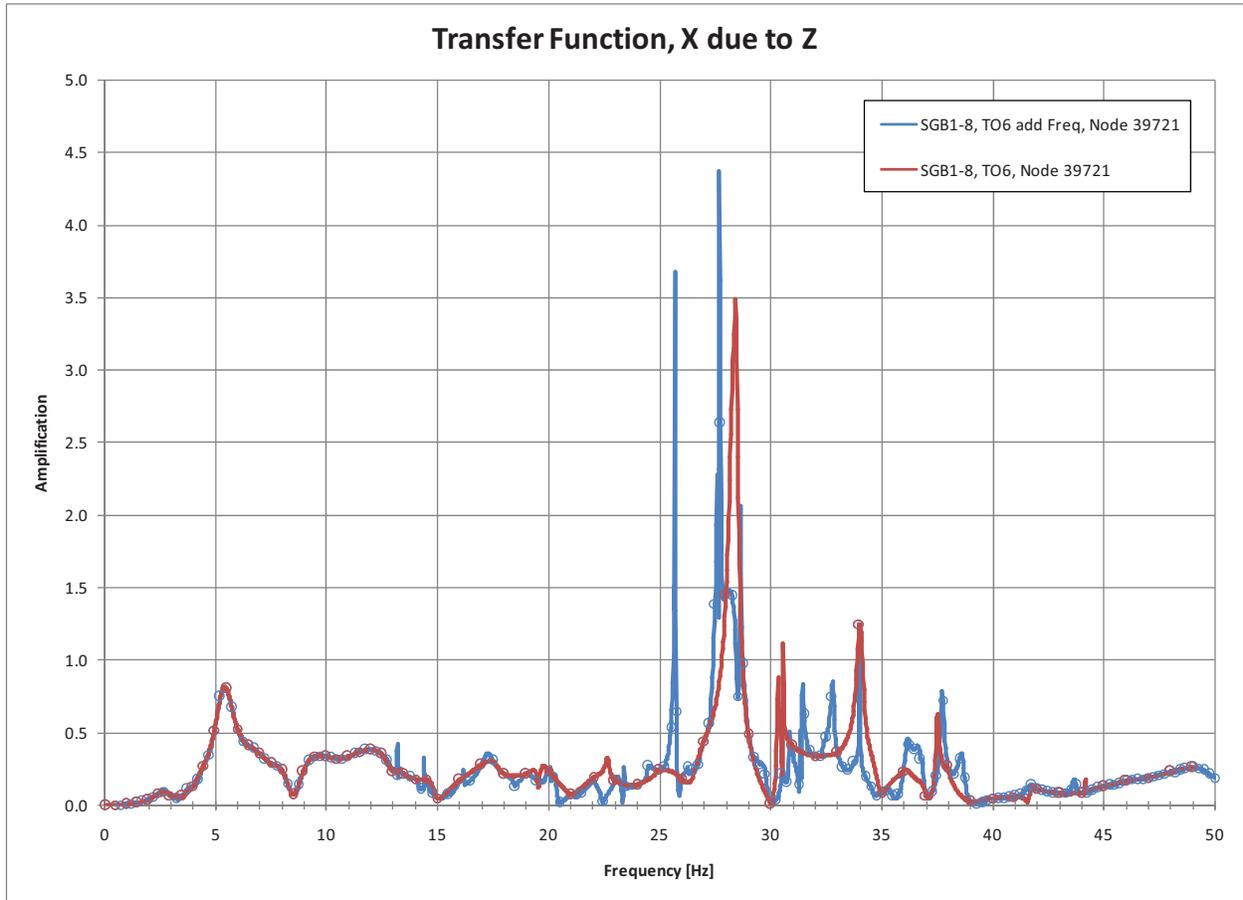
**Figure 03.07.02-73-6(a)—Node 39721 Transfer Function X due to X Motion**



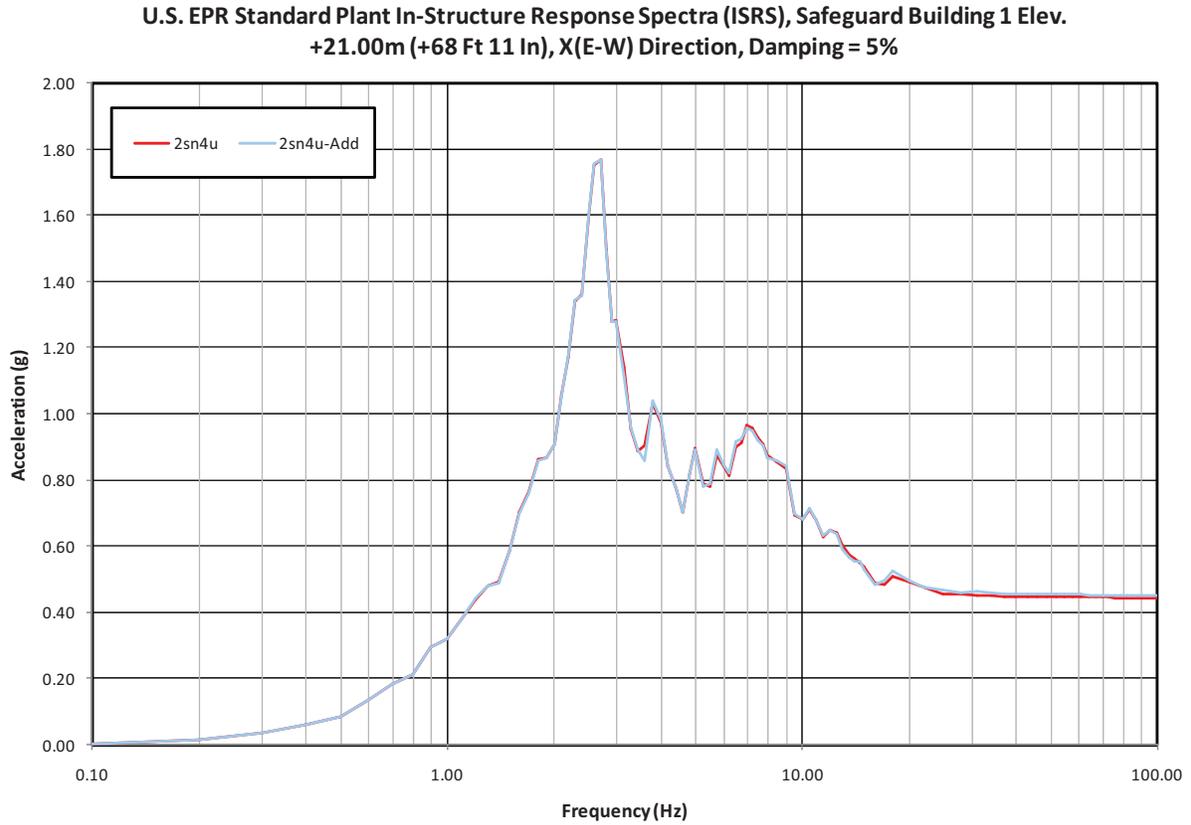
**Figure 03.07.02-73-6(b)—Node 39721 Transfer Function X due to Y Motion**



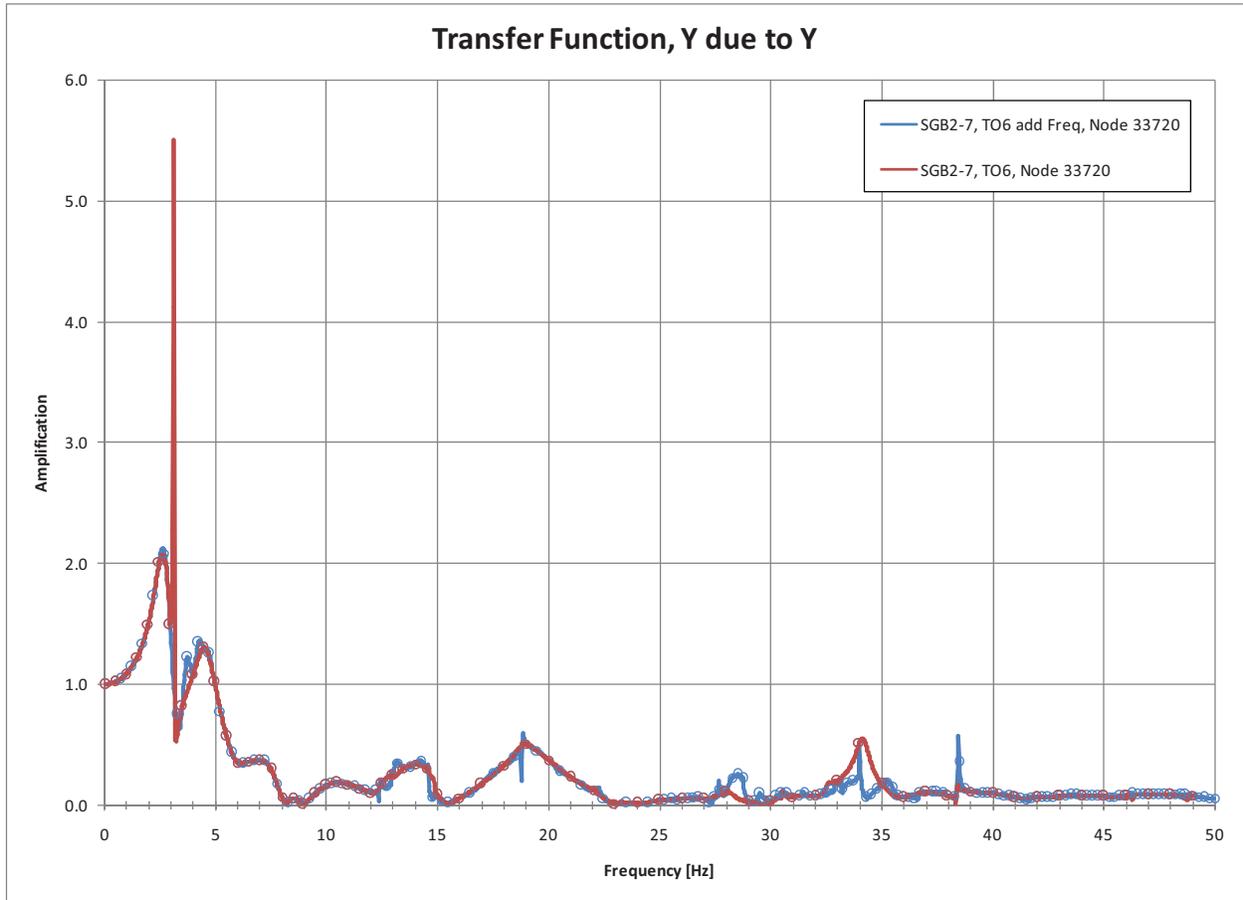
**Figure 03.07.02-73-6(c)—Node 39721 Transfer Function X due to Z Motion**



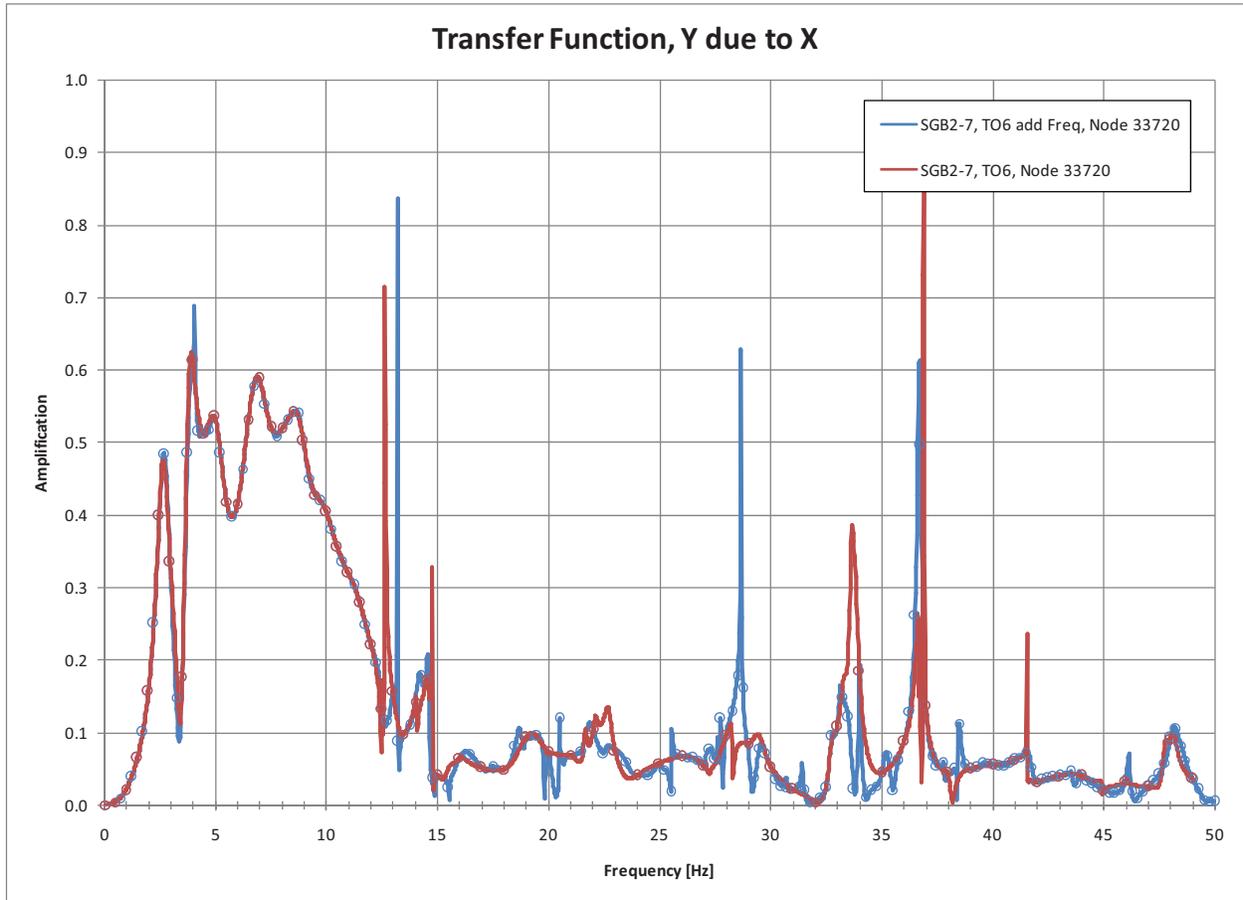
**Figure 03.07.02-73-7—Node 39721 Comparison of ISRS, X-Direction**



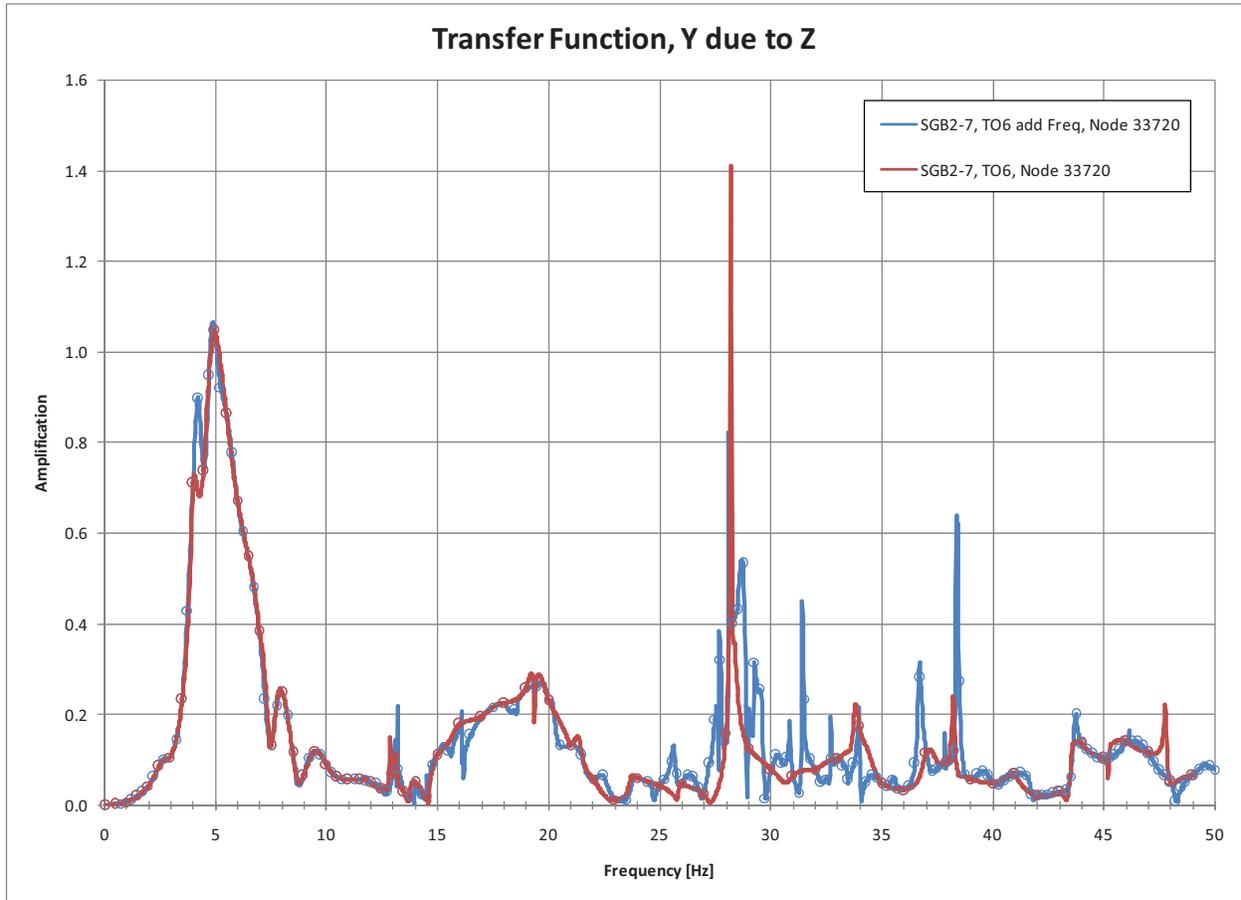
**Figure 03.07.02-73-8(a)—Node 33720 Transfer Function Y due to Y Motion**



**Figure 03.07.02-73-8(b)—Node 33720 Transfer Function Y due to X Motion**



**Figure 03.07.02-73-8(c)—Node 33720 Transfer Function Y due to Z Motion**



**Figure 03.07.02-73-9—Node 33720 Comparison of ISRS, Y-Direction**

