ArevaEPRDCPEm Resource

From: WILLIFORD Dennis (AREVA) [Dennis.Williford@areva.com]
Sent: Thursday, January 31, 2013 2:14 PM
To: Snyder, Amy
Cc: Miernicki, Michael; DELANO Karen (AREVA); LEIGHLITER John (AREVA); ROMINE Judy (AREVA); RYAN Tom (AREVA); WILLS Tiffany (AREVA)
Subject: Response to U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3, Supplement 6
Attachments: RAI 489 Suppplement 6 Response US EPR DC.pdf

Amy,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489. Supplement 1 was sent on October 14, 2011 to provide a revised schedule. Supplement 2 was sent on October 21, 2011 to provide an interim response to the one question and a revised schedule for the final response. Supplement 3 was sent on February 17, 2012 to provide a revised schedule. Supplement 4 was sent on April 3, 2012 to provide a revised interim response. Supplement 5 was sent on August 23, 2012 to provide a revised schedule for the final response.

The attached file, "RAI 489 Supplement 6 Response US EPR DC.pdf" provides a technically correct and complete final response to Question 03.07.02-75.

The following table indicates the respective pages in the response document, "RAI 489 Supplement 6 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 489 — 03.07.02-75	2	10

This concludes the formal AREVA NP response to RAI 489, and there are no other questions from this RAI for which AREVA NP has not provided responses.

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, August 23, 2012 6:17 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); LEIGHLITER John (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3, Supplement 5

Getachew,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489. Supplement 1 was sent on October 14, 2011 to provide a revised schedule. Supplement 2 was sent on October 21, 2011 to provide an interim response to the one question and a revised schedule for the final response. Supplement 3 was sent on February 17, 2012 to provide a revised schedule. Supplement 4 was sent on April 3, 2012 to provide a revised interim response to the one question.

The schedule for a technically correct and complete final response to the question has been changed as shown below.

Question #	Interim Response Date	Response Date
RAI 489 — 03.07.02-75	October 21, 2011 (Actual) April 3, 2012 (Actual)	**January 31, 2013**

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Tuesday, April 03, 2012 2:22 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 489 (5802), FSAR Ch. 3, Supplement 4

Getachew,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489. Supplement 1 was sent on October 14, 2011 to provide a revised schedule. Supplement 2 was sent on October 21, 2011 to provide an interim response to the one question and a revised schedule for the final response. Supplement 3 was sent on February 17, 2012 to provide a revised schedule.

The attached file, "RAI 489 Supplement 4 Response US EPR DC - INTERIM.pdf" provides a revised INTERIM response to Question 03.07.02-75.

The following table indicates the respective pages in the response document, "RAI 489 Supplement 4 Response US EPR DC - INTERIM.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 489 — 03.07.02-75	2	3

The schedule for a technically correct and complete final response to the question remains unchanged as shown below.

Question #	Interim Response Date	Response Date
RAI 489 — 03.07.02-75	October 21, 2011 (Actual) **April 3, 2012 (Actual)**	October 29, 2012

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, February 17, 2012 1:15 PM
To: Getachew.Tesfaye@nrc.gov
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); KOWALSKI David (RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3, Supplement 3

Getachew,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489. Supplement 1 was sent on October 14, 2011 to provide a revised schedule. Supplement 2 was sent on October 21, 2011 to provide an interim response to the one question and a revised schedule for the final response.

The schedule for a technically correct and complete final response to the question has been changed as provided below.

Question #	Interim Response Date	Response Date
RAI 489 — 03.07.02-75	October 21, 2011 (Actual)	**October 29, 2012**

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, October 21, 2011 12:48 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 489 (5802), FSAR Ch. 3, Supplement 2

Getachew,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489. Supplement 1 was sent on October 14, 2011 to provide a revised schedule.

The attached file, "RAI 489 Supplement 2 Response US EPR DC - Interim.pdf" provides an INTERIM response to Question 03.07.02-75.

The following table indicates the respective pages in the response document, "RAI 489 Supplement 2 Response US EPR DC - Interim.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 489 — 03.07.02-75	2	100

The schedule for a technically correct and complete final response to the question has been changed as provided below.

Question #	Interim Response Date	Response Date
RAI 489 — 03.07.02-75	**October 21, 2011 (Actual)**	**February 17, 2012**

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Friday, October 14, 2011 3:47 PM
To: Getachew.Tesfaye@nrc.gov
Cc: 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. 489 (5802), FSAR Ch. 3, Supplement 1

Getachew,

On June 23, 2011, AREVA NP Inc. provided a schedule for a technically correct and complete response to the 1 question in RAI 489.

The schedule for a technically correct and complete interim and final response to the question has been changed as provided below.

Question #	Interim Response Date	Response Date
RAI 489 — 03.07.02-75	**October 21, 2011**	**January 10, 2012**

Sincerely,

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

From: WILLIFORD Dennis (RS/NB)
Sent: Thursday, June 23, 2011 11:49 AM
To: Tesfaye, Getachew
Cc: BENNETT Kathy (RS/NB); DELANO Karen (RS/NB); ROMINE Judy (RS/NB); RYAN Tom (RS/NB); CORNELL Veronica (External RS/NB)
Subject: Response to U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 489 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the question cannot be provided at this time.

The following table indicates the respective pages in the response document, "RAI 489 Response US EPR DC.pdf," that contain AREVA NP's response to the subject question.

Question #	Start Page	End Page
RAI 489 — 03.07.02-75	2	2

The schedule for a technically correct and complete response to this question is provided below.

Question #	Response Date
RAI 489 — 03.07.02-75	October 14, 2011

Sincerely,

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

From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Tuesday, May 24, 2011 4:20 PM
To: ZZ-DL-A-USEPR-DL
Cc: Xu, Jim; Shams, Mohamed; Hawkins, Kimberly; Miernicki, Michael; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on May 16, 2011, and on May 24, 2011, 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: 4202

Mail Envelope Properties (554210743EFE354B8D5741BEB695E6560BF7FA)

Subject: Response to U.S. EPR Design Certification Application RAI No. 489 (5802), FSAR Ch. 3, Supplement 6
Sent Date: 1/31/2013 2:13:48 PM
Received Date: 1/31/2013 2:14:14 PM
From: WILLIFORD Dennis (AREVA)

Created By: Dennis.Williford@areva.com

Recipients:
"Miernicki, Michael" <Michael.Miernicki@nrc.gov>
Tracking Status: None
"DELANO Karen (AREVA)" <Karen.Delano@areva.com>
Tracking Status: None
"LEIGHLITER John (AREVA)" <John.Leighliter@areva.com>
Tracking Status: None
"ROMINE Judy (AREVA)" <Judy.Romine@areva.com>
Tracking Status: None
"RYAN Tom (AREVA)" <Tom.Ryan@areva.com>
Tracking Status: None
"WILLS Tiffany (AREVA)" <Tiffany.Wills@areva.com>
Tracking Status: None
"Snyder, Amy" <Amy.Snyder@nrc.gov>
Tracking Status: None

Post Office: FUSLYNCMX03.fdom.ad.corp

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RAI 489 Suppplement 6 Response US EPR DC.pdf		1452840

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Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Response to

Request for Additional Information No. 489, Supplement 06

5/24/2011

U.S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 03.07.02 - Seismic System Analysis
Application Section: 3.7.2

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

Question 03.07.02-75:

POTENTIAL OPEN ITEM

The Defense Nuclear Facilities Safety Board (DNFSB) issued a letter on April 8th, 2011 requesting the Department of Energy (DOE) to address technical and software quality assurance issues related to potentially erroneous seismic analyses performed using the SASSI Subtraction method. A version of SASSI is used by AREVA in the seismic analyses performed in support of the U.S. EPR design certification (DC) application.

The analyses included in Rev. 0 and Rev. 1 of the FSAR were performed considering the NI basemat structures, the NAB, and the EPGB as surface structures. Therefore, the subtraction method is not a concern in these calculations. The ESWB is analyzed as an embedded structure Therefore the subtraction issue may be of concern for this analysis if it were used in the SASSI modeling approach. The response to RAI 320 indicates that the updated analyses involve considering embedment effects for these structures.

To ensure the applicant has adequately met General Design Criteria (GDC) 1 and 2 to Part 50 and Appendix B to Part 50, the staff requests AREVA to provide to following information:

a. Confirm whether the SASSI Subtraction method is used in the seismic analyses
b. Provide how AREVA addresses the technical and software quality assurance issues raised by DNFSB letter in the version of SASSI which AREVA uses for seismic analyses
c. If the SASSI Subtraction method is used by AREVA, provide an assessment to establish: a) the seismic analyses performed in support of the U.S. EPR DC application do not contain any errors or anomalies as identified in DNFSB letter, b) QA steps taken to ensure any future seismic analyses in support of the U.S. EPR DC application will be free from errors or anomalies as identified in DNFSB letter

Response to Question 03.07.02-75:

Item a:

The Subtraction Method in MTR/SASSI was used for the soil-structure interaction (SSI) analysis of the following structures:

- Nuclear Island (NI) and Nuclear Auxiliary Building (NAB).
- Emergency Power Generating Building (EPGB).
- Essential Service Water Building (ESWB).

The NI and NAB were originally modeled as surface-founded structures in Rev. 0 and Rev. 1 of the U.S. EPR FSAR, but were later analyzed as embedded structures using the MTR/SASSI Subtraction Method. The NI SSI analysis using the Subtraction Method is described in U.S. EPR FSAR Tier 2, Section 3.7.2.4.

The EPGB was originally modeled as a surface-founded structure in Rev. 0 and Rev. 1 of the U.S. EPR FSAR, but was later analyzed using the MTR/SASSI Subtraction Method. The EPGB SSI analysis is described in U.S. EPR FSAR Tier 2, Section 3.7.2.4.

The ESWB was originally analyzed using Bechtel's SASSI2000 Subtraction Method in Rev. 0 and Rev. 1 of the U.S. EPR FSAR. A description of the analysis will be provided in the Response to RAI 376, Question 03.08.05-31.

Direct Method analyses of the NI, EPGB and ESWB will be performed to generate the following new seismic inputs:

- ZPAs
- Design Loads
- Time Histories
- ISRS

Each of the seismic inputs will be assessed to determine the impact to the U.S. EPR NI design. U.S. EPR EPGB and ESWB design will use the Direct Method results. Direct Method analyses and results and changes to the model will be described in a Supplemental Response to RAI 320, Question 03.07.02-63 and RAI 376, Question 03.08.05-31.

Item b:

MTR/SASSI was upgraded to version 9.5 HPC to run large models, such as the U.S. EPR Nuclear Island, using the Direct Method. This new capability is used to assess the adequacy of previous SSI analyses that used the Subtraction Method. See the response to Item c.

AREVA has its own suite of test problems to test the MTR/SASSI being used in the U.S. EPR project. For the commercial grade dedication of MTR/SASSI, AREVA follows its QA procedural requirements which incorporate the requirements of NQA-1-2008 with 2009 addendum that includes commercial grade dedication of software. The MTR/SASSI commercial dedication package is available for NRC inspection.

Item c:

Nuclear Island (NI)

The NI model has changed from the NI model analyzed using the Subtraction Method as a result of Responses to RAI 547, Question 03.07.02-76, and RAI 370, Question 03.07.01-27. These changes include geometry changes as well as the use of OBE damping for ISRS generation.

The NI Direct Method includes the geometry changes and OBE damping. Comparisons between the Direct Method and Subtraction Method ZPA results are being evaluated to determine if the Subtraction Method results are impacted. The SSI analysis used for the U.S. EPR design will be described in the Response to RAI 320, Question 03.07.02-63.

The Direct Method time histories and ISRS will be used in the U.S. EPR design. Downstream effects on models, analyses, and loads will use Direct Method time histories and ISRS or provide a basis for using an alternate approach. Downstream effects on RCS/Fuels and Fuel Rack Design will be provided in Supplemental responses to RAI 201, Question 03.07.02-35 and RAI 445, Question 03.08.04-20, respectively. In addition, the Supplemental Response to RAI 320, Question 03.07.02-63 will identify any additional impacts to previously submitted RAI responses.

Figures 03.07.02-75-1 through 03.07.02-75-6 are examples of the NI ISRS using Direct Method results and includes NI geometry changes and OBE damping.

Additional changes to U.S. EPR design will be evaluated on case by case basis.

NAB

The NAB stability analysis is currently based upon time histories using the Subtraction Method. Time histories using the Direct Method have been generated and the impact of the new time histories is being evaluated. The basis for the SSI analysis and analysis results will be provided in the Response to RAI 370, Question 03.07.02-64.

EPGB

The EPGB was reanalyzed using the Direct Method. New ZPAs, time histories, design loads, and ISRS are generated and used in the design of the EPGB critical sections. The EPGB SSI Direct Method analysis and results (text, table and figures) will be described in the Supplemental Response to RAI 376 Question 03.08.05-31.

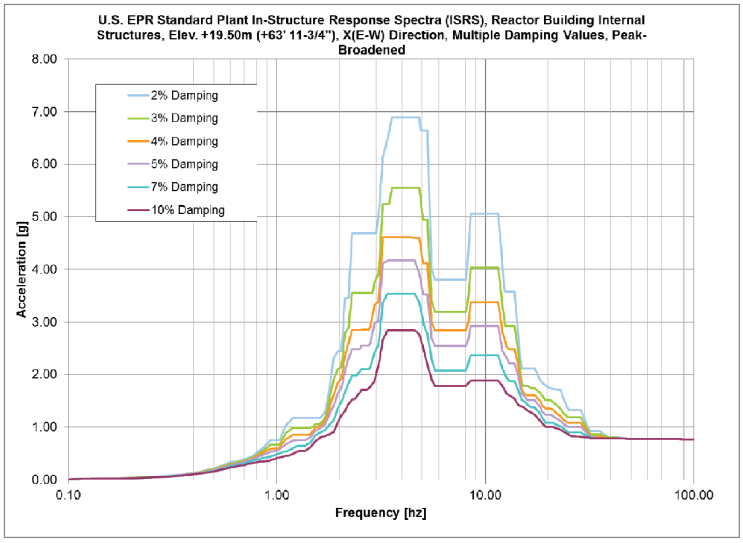
ESWB

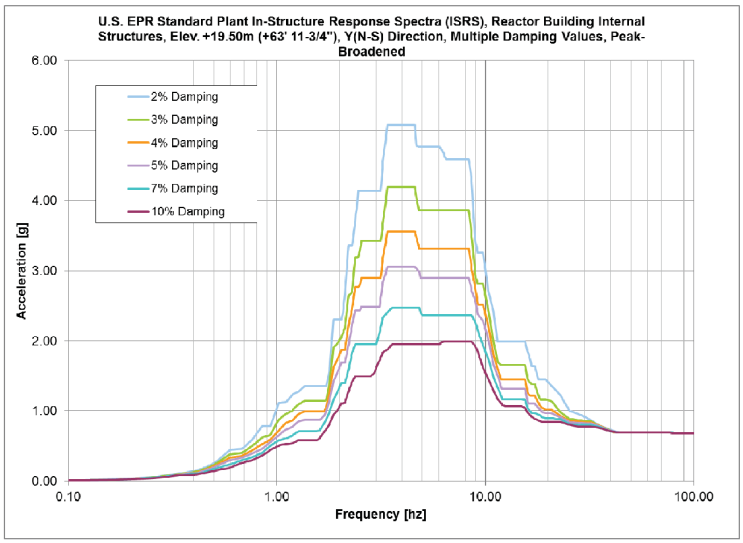
The ESWB will also be reanalyzed using the Direct Method. The Direct Method results will be used in the design of the ESWB critical sections. The ESWB Direct Method SSI analysis and results (text, table and figures) will be described in the Supplemental Response to RAI 376, Question 03.08.05-31.

FSAR Impact:

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

Figure 03.07.02-75-1: U.S. EPR Standard Plant In-Structure Response Spectra Reactor Building Internal Structures Elevation +19.50m





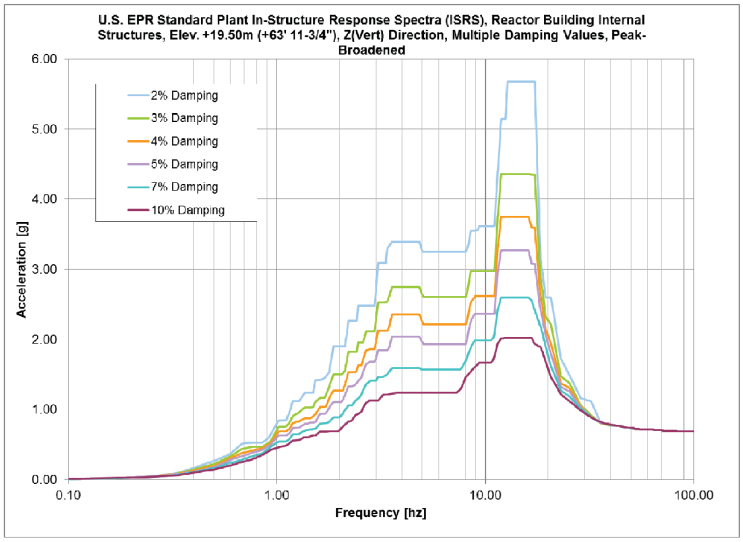
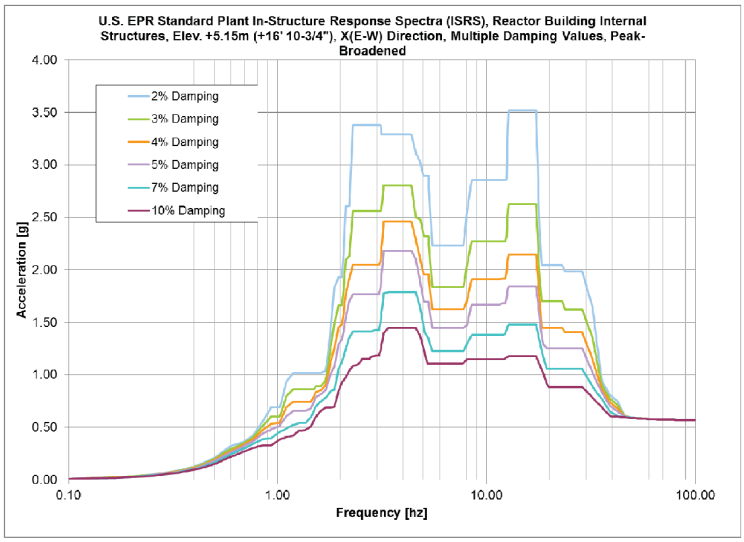
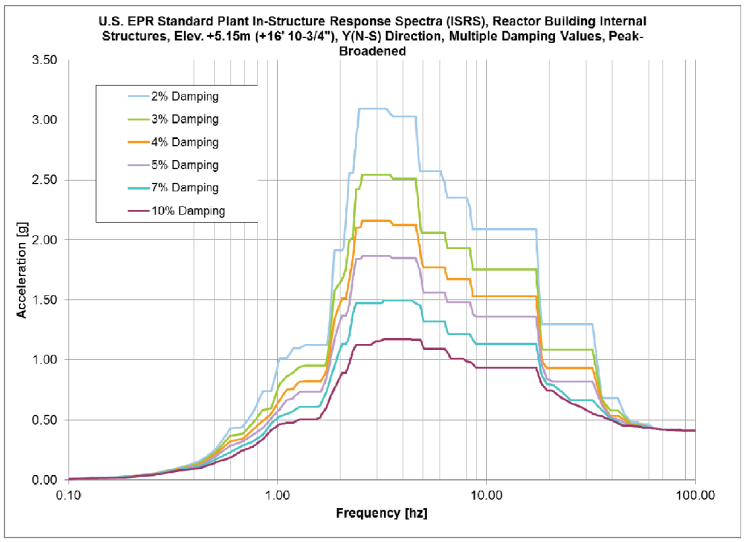


Figure 03.07.02-75-2: U.S. EPR Standard Plant In-Structure Response Spectra Reactor Building Internal Structures Elevation +5.15m





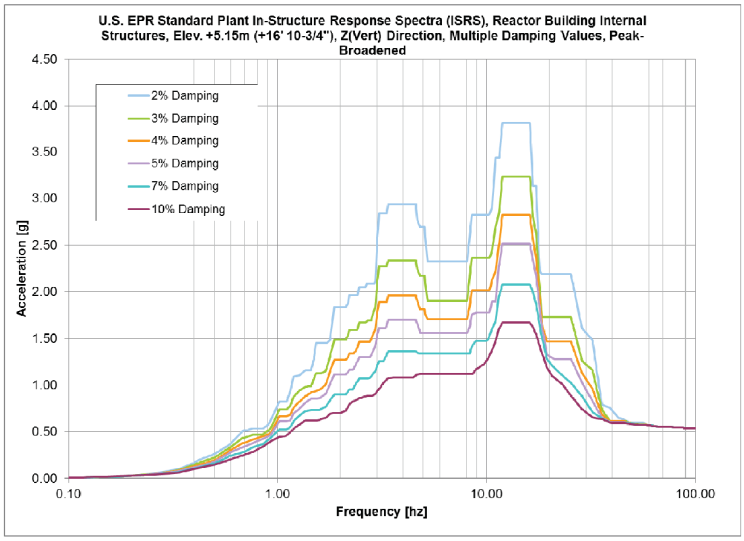
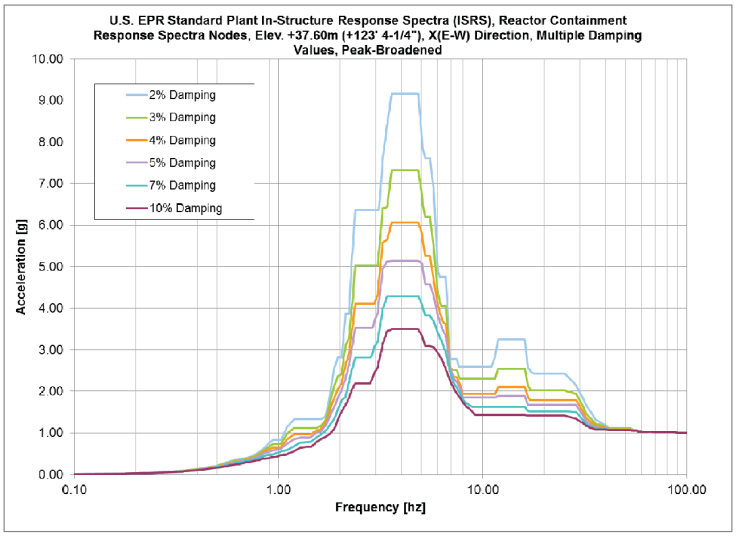
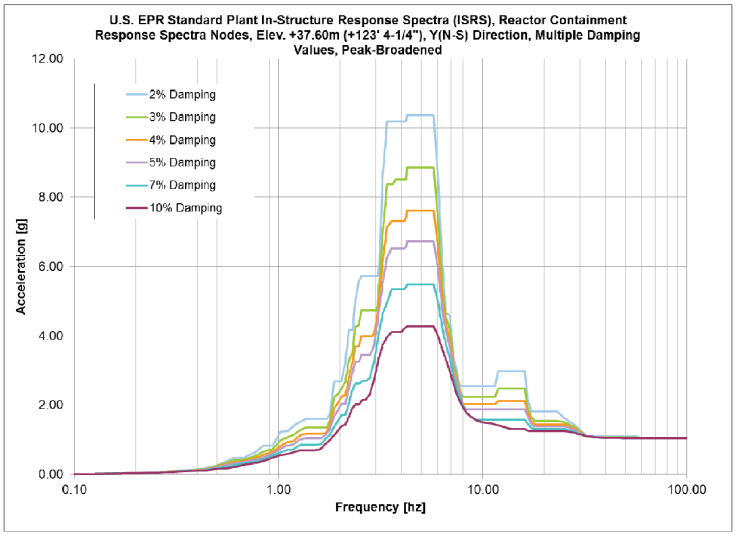


Figure 03.07.02-75-3: U.S. EPR Standard Plant In-Structure Response Spectra Reactor Containment Building Elevation +37.60m





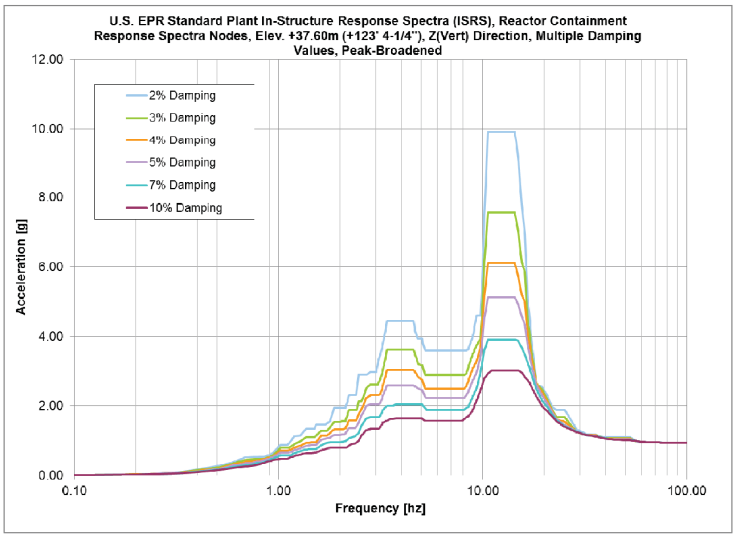
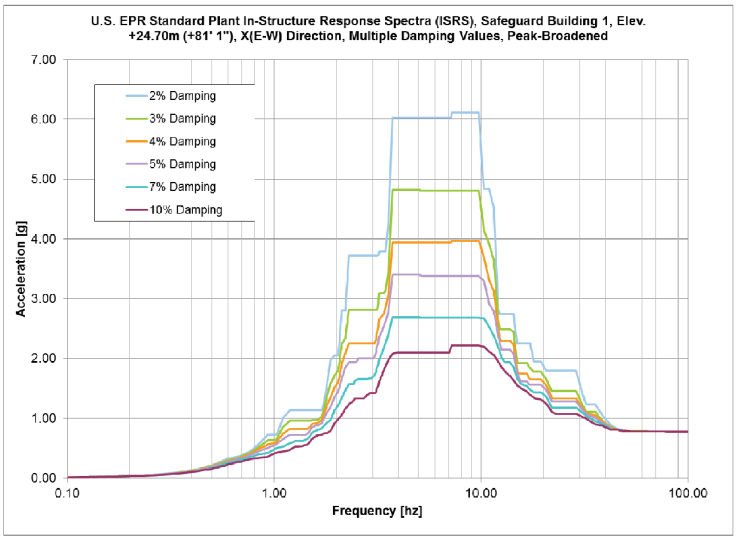
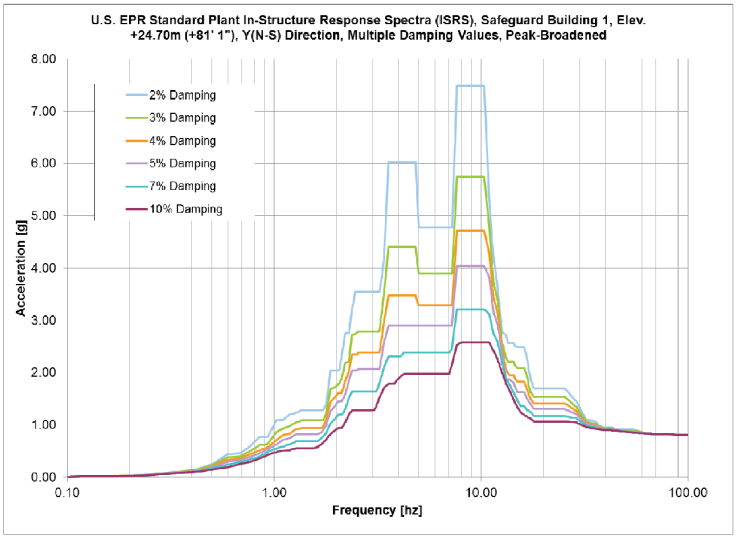


Figure 03.07.02-75-4: U.S. EPR Standard Plant In-Structure Response Spectra Safeguard Building 1 Elevation +24.70m





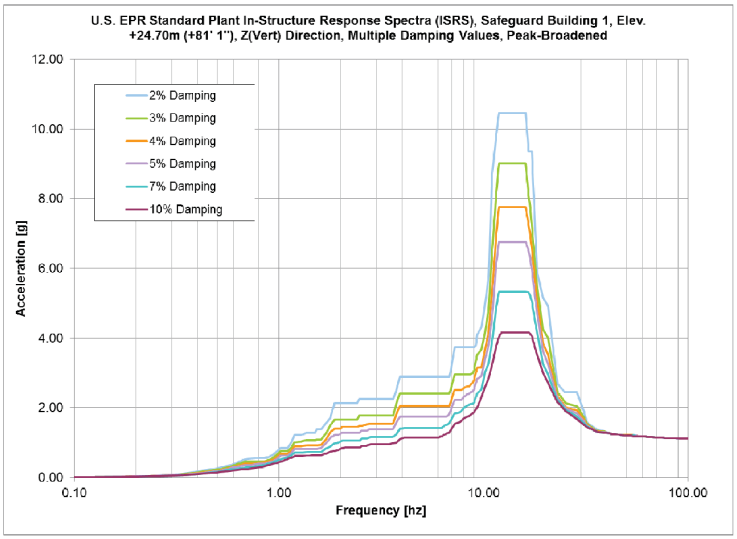
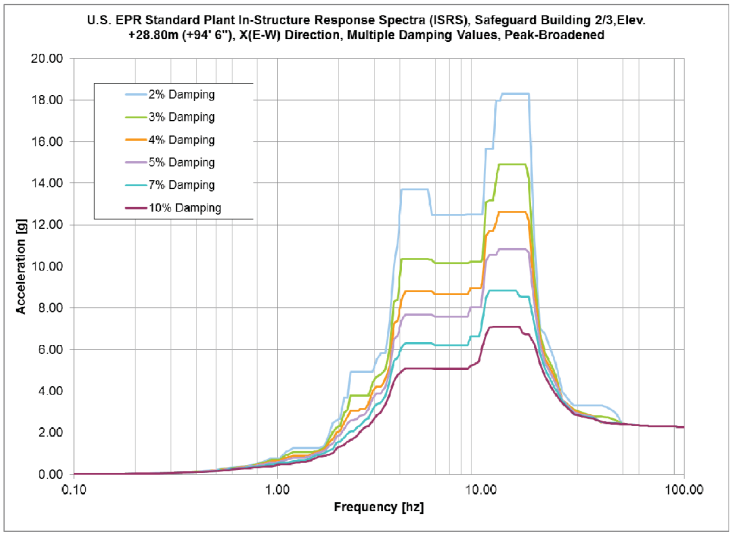
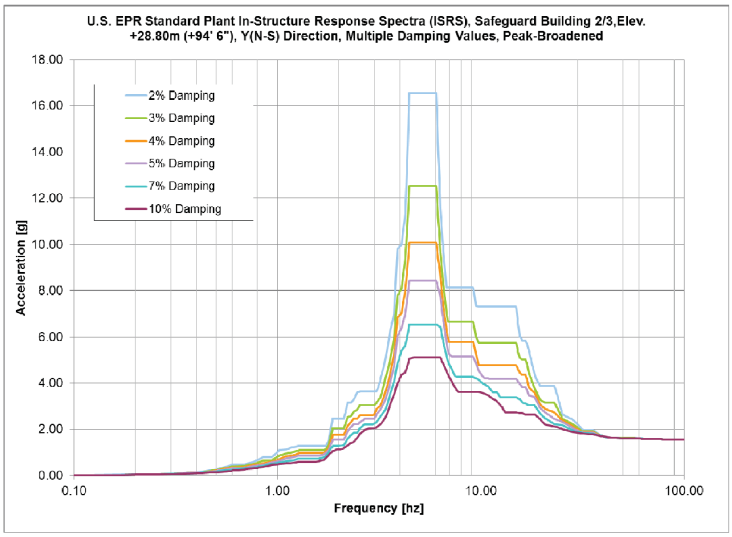


Figure 03.07.02-75-5: U.S. EPR Standard Plant In-Structure Response Spectra Safeguard Building 2/3 Elevation +28.80m





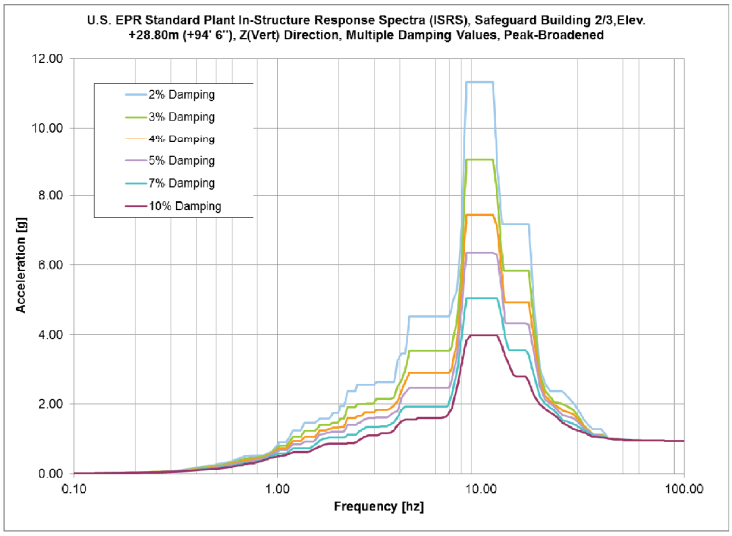
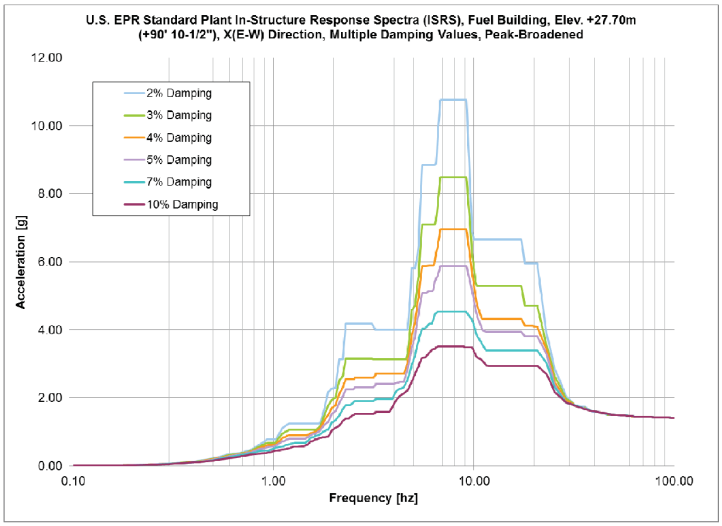
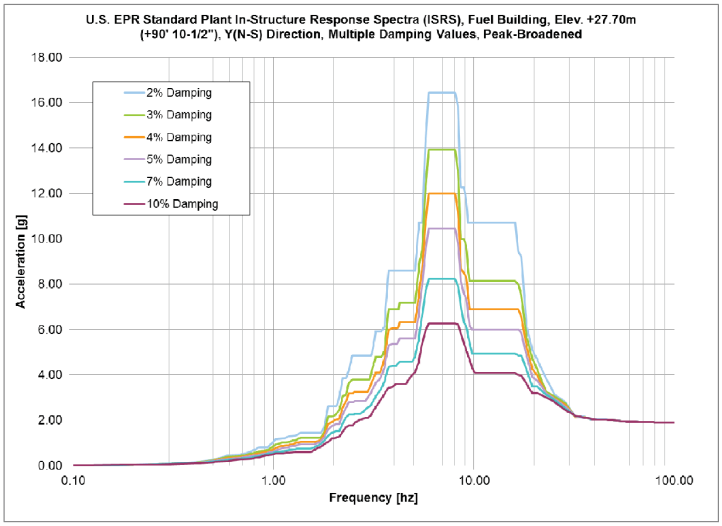
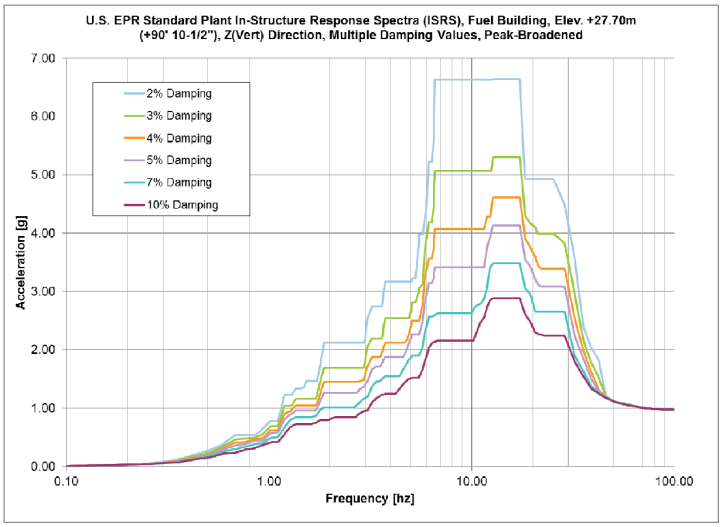



Figure 03.07.02-75-6: U.S. EPR Standard Plant In-Structure Response Spectra Fuel Building Elevation +27.70m