PMFermiCOLPEm Resource

From: Govan, Tekia
Sent: Thursday, August 14, 2014 8:56 AM
To: FermiCOL Resource
Subject: FW: Fermi 3 Draft ACRS Presentations (Email #1)
Attachments: Section 3.7 & 3.8_Draft.pdf; Opening Remarks_Draft.pdf

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From: Nicholas A Latzy [mailto:latzyn@dteenergy.com]
Sent: Wednesday, August 13, 2014 3:11 PM
To: Govan, Tekia
Subject: Fw: Fermi 3 Draft ACRS Presentations (Email #1)

Tekia,

Attached to this email and the next email (email #2) are the DRAFT Fermi 3 ACRS Presentations for the August 20, 2014 meeting.

If you have any questions concerning these presentations, please feel free to contact me.

Thank you

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(See attached file: Section 3.7 & 3.8_Draft.pdf)(See attached file: Opening Remarks_Draft.pdf)

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Fermi 3 COLA
Presentation to ACRS Subcommittee
Section 3.7 and 3.8

Background

- Fermi 3 site-specific Soil-Structure Interaction (SSI) was performed to address:
  - Partial embedment of Seismic Category I structures
  - Evaluate side backfill for Seismic Category I structures as permitted by DCD
- Initial SSI (2011-2012) analysis used the subtraction method
- In 2012, Fukushima Near Term Task force Recommendation 2.1 required evaluation of the Central and Eastern US Seismic Source Characterization (CEUS SSC) model
- DTE Energy elected to re-perform all prior Fermi 3 site-specific SSI analysis using CEUS SSC based inputs
- Resulted in a coherent set of analyses which demonstrate the Fermi 3 site is well enveloped by the ESBWR standard plant design

Introduction

Discussion Topics:

- 3.7 Seismic Design
  - Seismic Design Parameters: Design ground motion with comparison to Certified Seismic Design Response Spectra (CSDRS)
  - Seismic System Analysis: SSI
- 3.8 Seismic Category I Structures
  - Other Seismic Category I Structures
  - Foundations

Section 3.7 – Seismic Design

Site-Specific SSI and Structure-Soil-Structure Interaction (SSSI) analyses were performed to demonstrate the Fermi 3 site is well enveloped by the ESBWR standard plant design

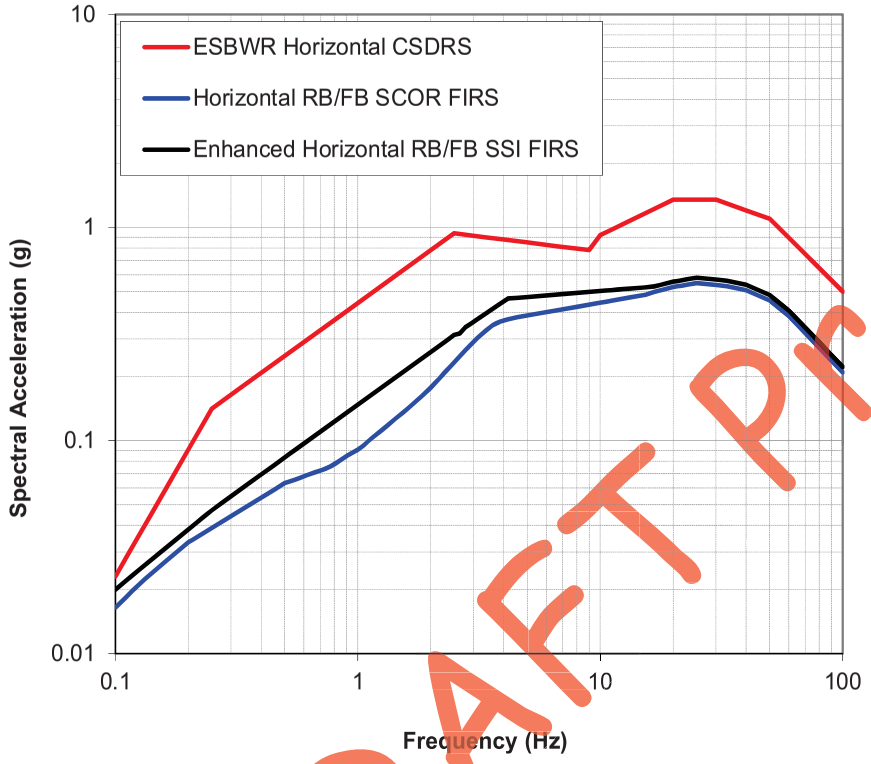
- Updated site-specific seismic inputs based on CEUS SSC model
- Accounted for partial embedment of the Reactor Building/Fuel Building (RB/FB) and Control Building (CB) into the Bass Islands Group bedrock
- Evaluated side backfill for Seismic Category I structures as permitted by DCD

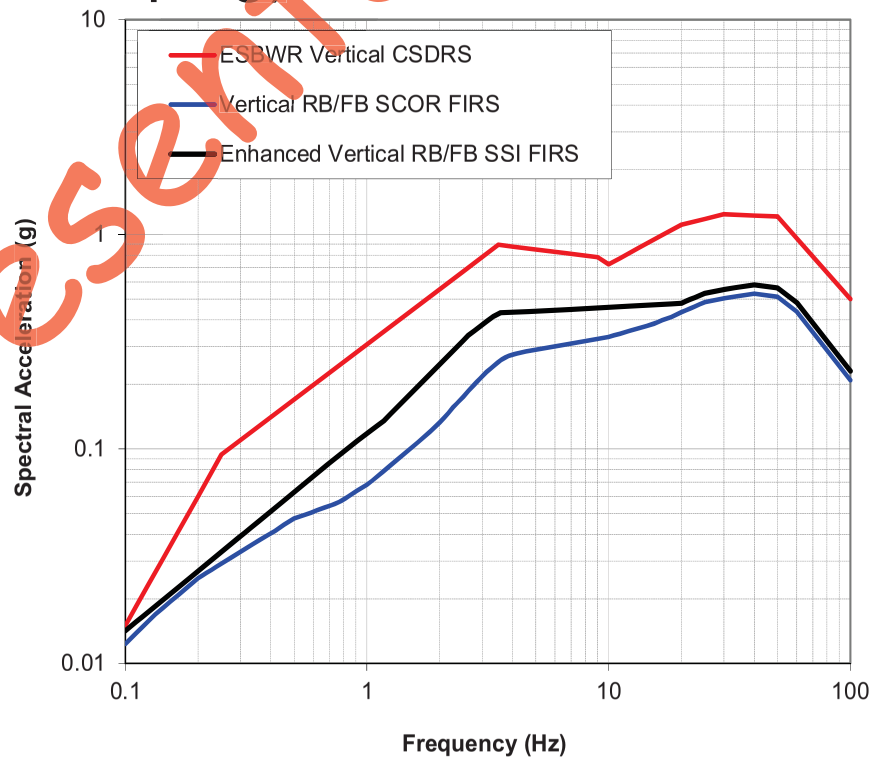
Section 3.7.1 – Seismic Design Inputs

Seismic Design Parameters:

- Computed site-specific amplification functions to develop Foundation Input Response Spectra (FIRS)
- Determined horizontal and vertical FIRS for the RB/FB and CB
- Enhanced the FIRS to satisfy minimum ground motion requirements specified in 10 CFR Part 50, Appendix S and to satisfy ISG-17 recommendations for hazard consistent spectra
- Developed ground motion time histories and subsurface material properties for SSI analyses

Fermi 3 RB/FB FIRS compared to ESBWR CSDRS (5 percent damping)

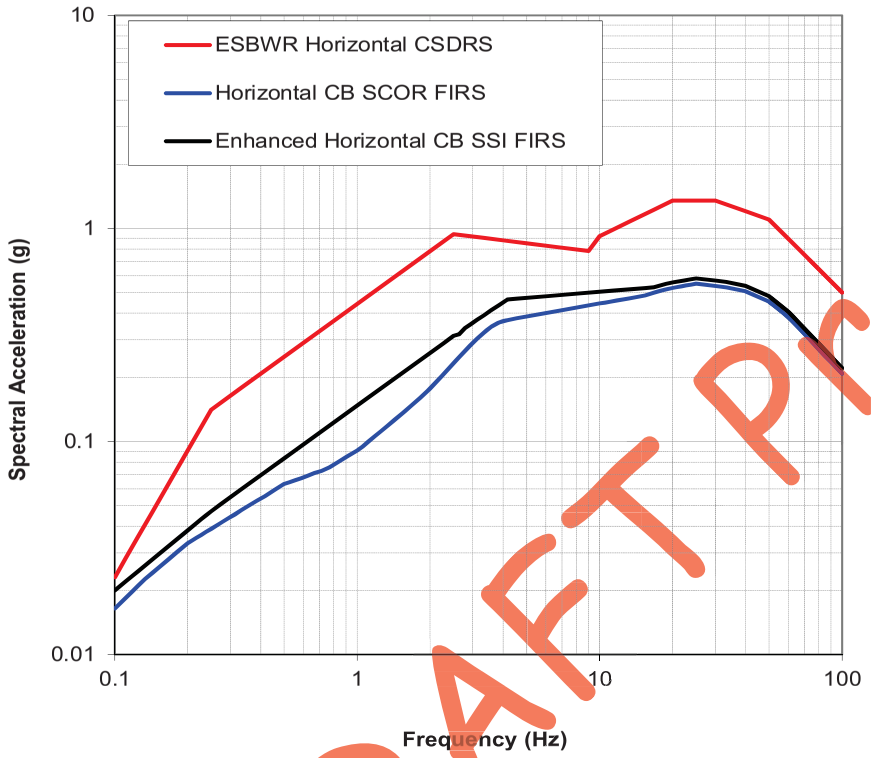


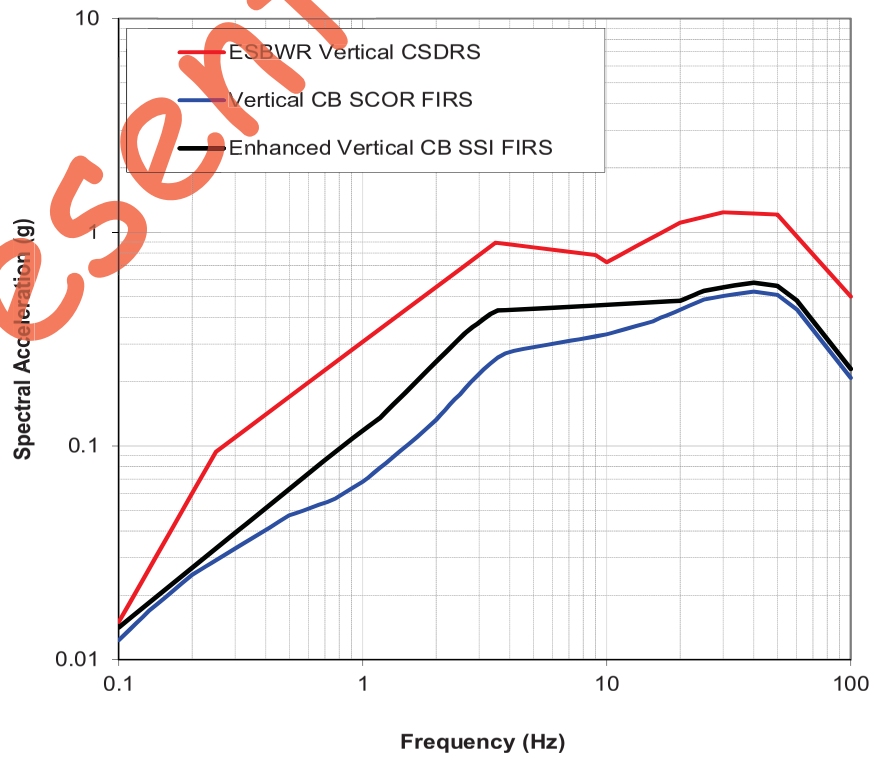


FIRS for Fermi 3 RB/FB are enveloped by the ESBWR horizontal and vertical CSDRS

Section 3.7.1 – Seismic Design Inputs (continued)

Fermi 3 CB FIRS compared to ESBWR CSDRS (5 percent damping)





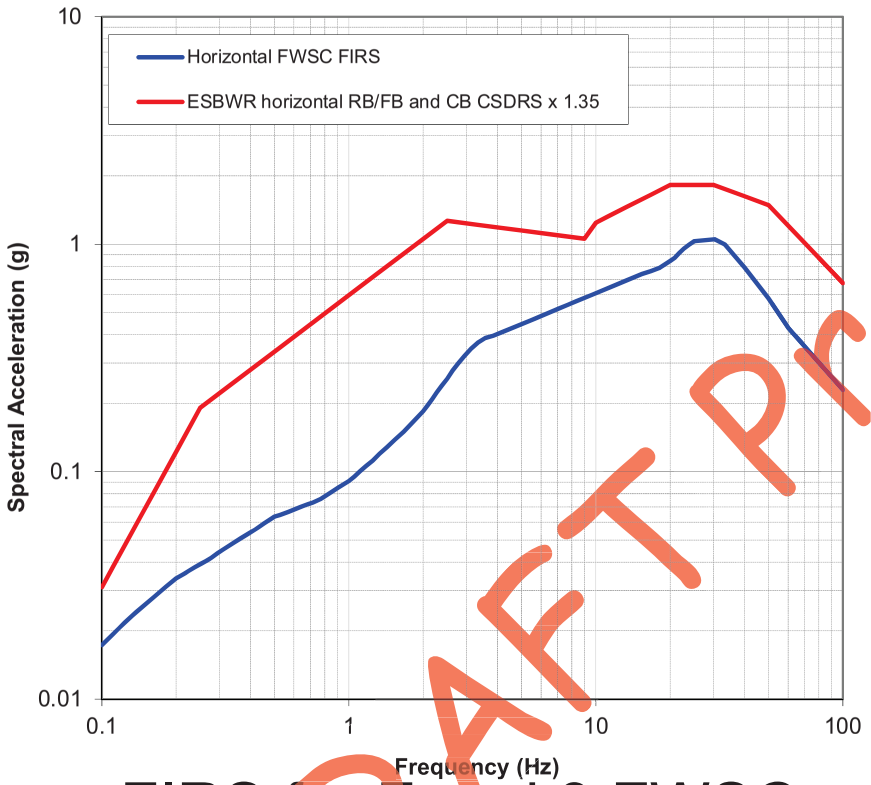
FIRS for Fermi 3 CB are enveloped by the ESBWR horizontal and vertical CSDRS

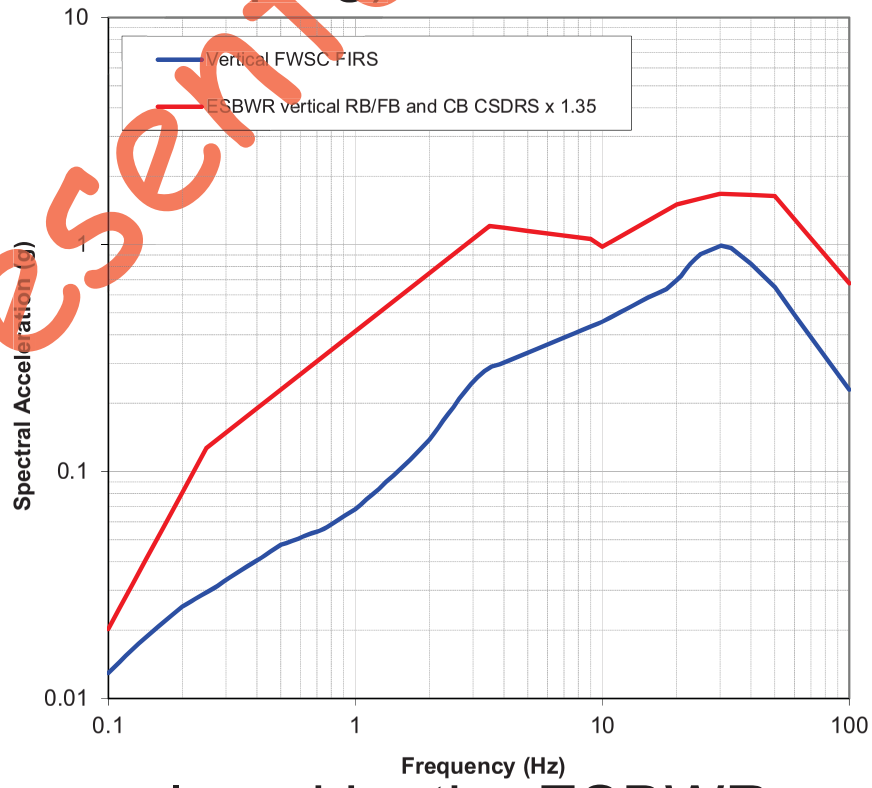
Section 3.7.1 – Seismic Design Inputs (continued)

- Fire Water Service Complex (FWSC) is a surface founded structure on fill concrete above bedrock
- FWSC FIRS is well enveloped by ESBWR CSDRS x 1.35
- All FWSC requirements are satisfied

Section 3.7.1 – Seismic Design Inputs (continued)

Fermi 3 FWSC FIRS compared to 1.35 times ESBWR CSDRS (5 percent damping)





FIRS for Fermi 3 FWSC are enveloped by the ESBWR horizontal and vertical CSDRS

Section 3.7.1 – Conclusion

Site-specific FIRS are enveloped by ESBWR CSDRS design motions

Section 3.7.2 – Soil-Structure Interaction

Seismic System Analysis:

Fermi 3 site-specific SSI analyses were performed to evaluate partial embedment and to address ESBWR requirements for side backfill

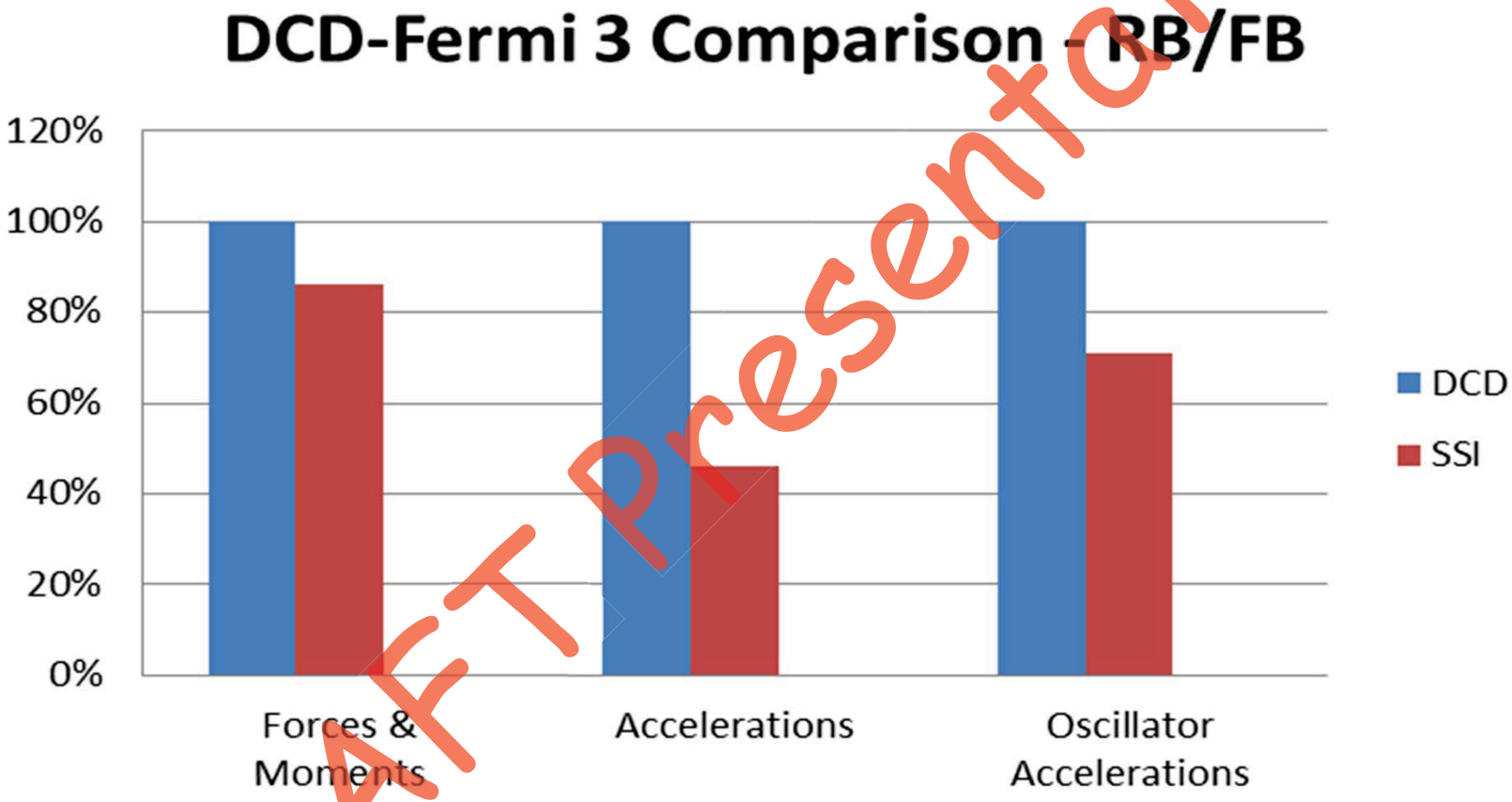
- Followed methodology presented in DCD Appendix 3A with the ESBWR structural models for the RB/FB and CB
- Fermi 3 site-specific SSI and SSSI analyses were performed using SASSI2010:
  - Used the direct method of analysis wherever possible
  - The modified subtraction method of analysis was used where the number of Interaction Nodes exceeded the capacity of SASSI2010 using the direct method
  - Benchmarked the modified subtraction method against the direct method

Section 3.7.2 – Conclusion

- Analyses for RB/FB and CB were performed with and without the engineered granular backfill

- Results from the Fermi 3 SSI and SSSI analyses show the seismic forces in members, accelerations, and floor response spectra are well enveloped by the ESBWR standard plant design for both the RB/FB and CB

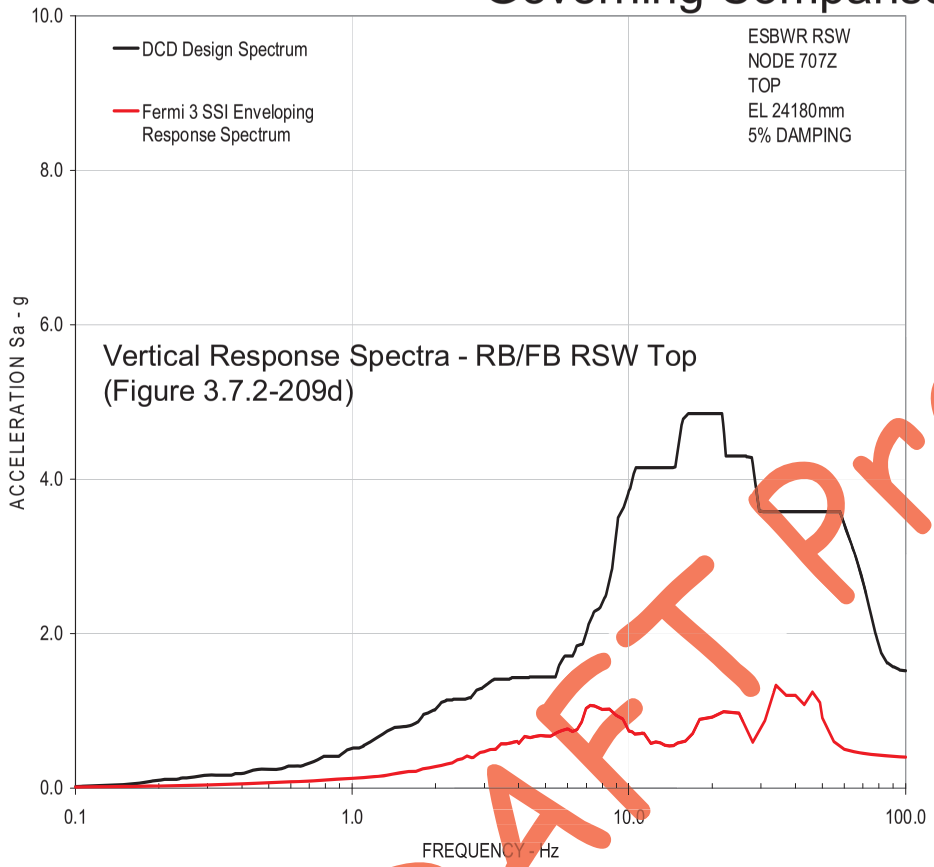
Section 3.7.2 – Conclusion (continued)

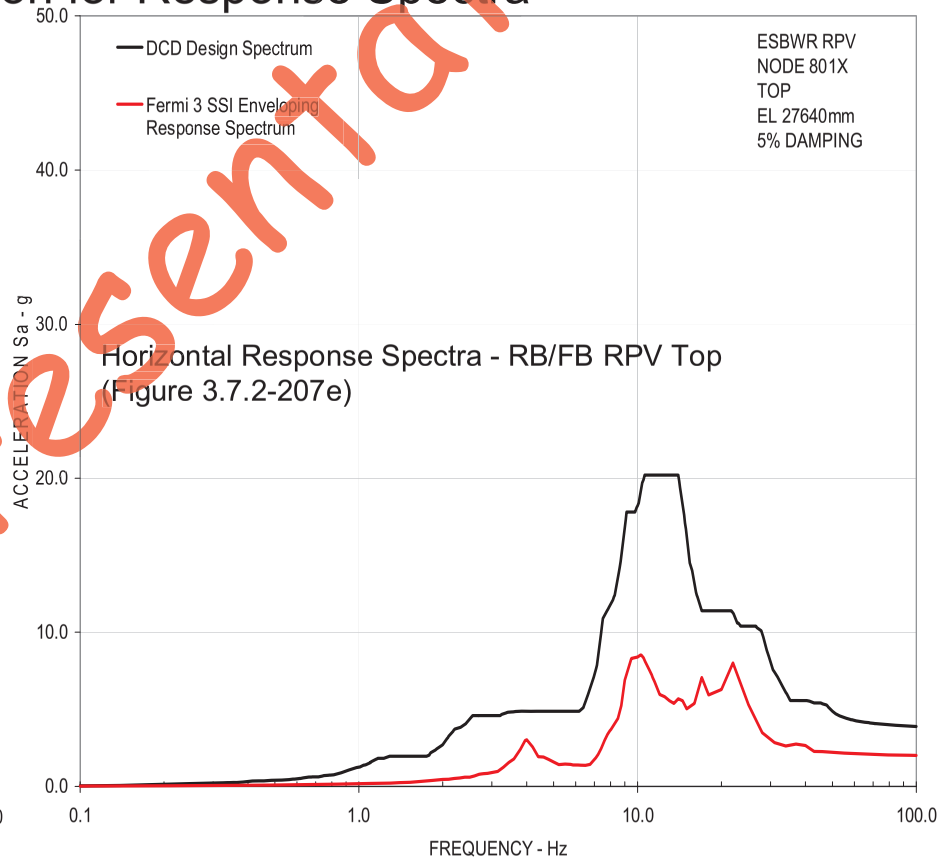


The Fermi 3 RB/FB is well enveloped by the ESBWR RB/FB standard plant design

Section 3.7.2 – Conclusion (continued)

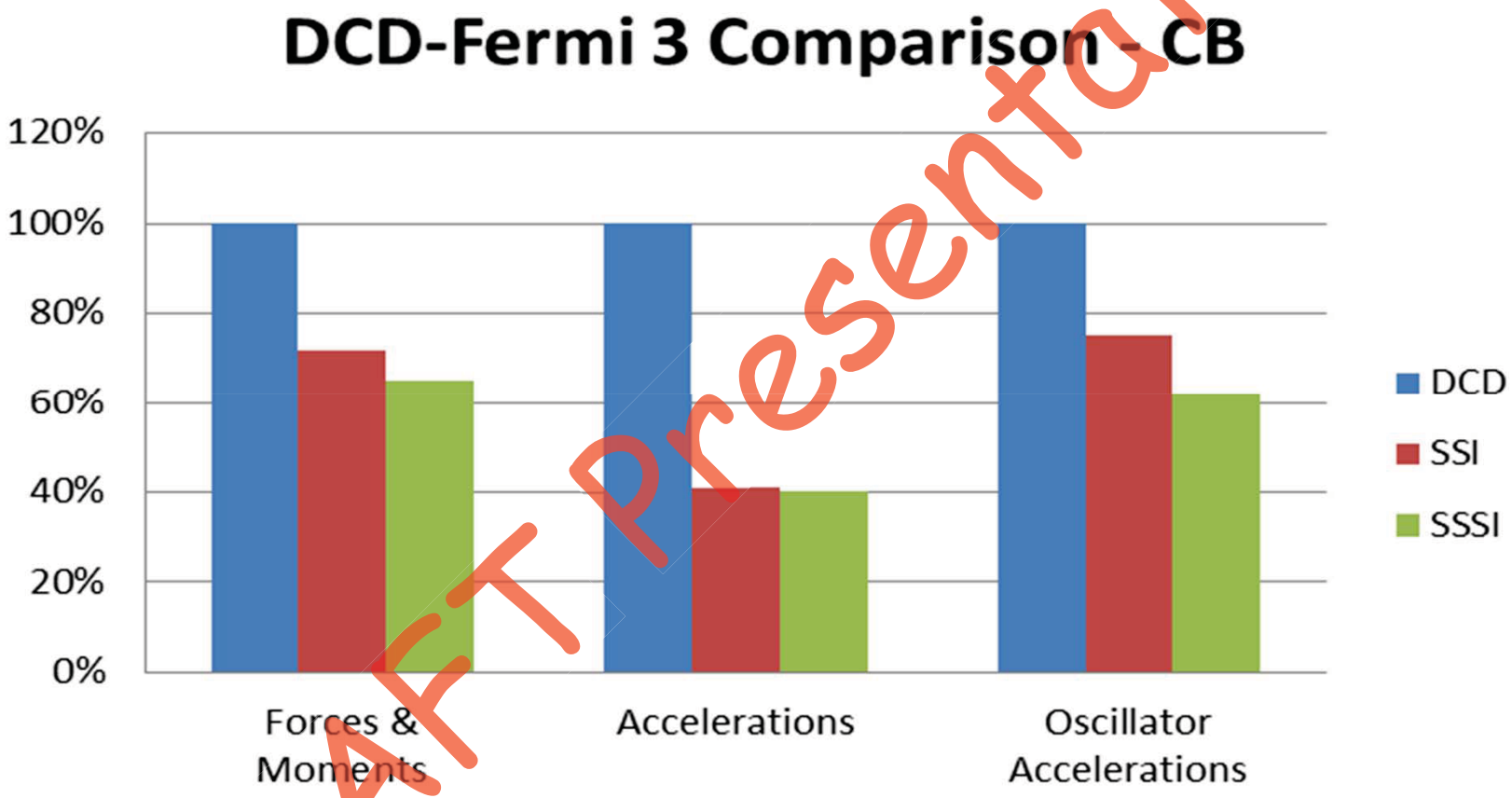
Governing Comparison for Response Spectra





The Fermi 3 RB/FB is well enveloped by the ESBWR RB/FB standard plant design

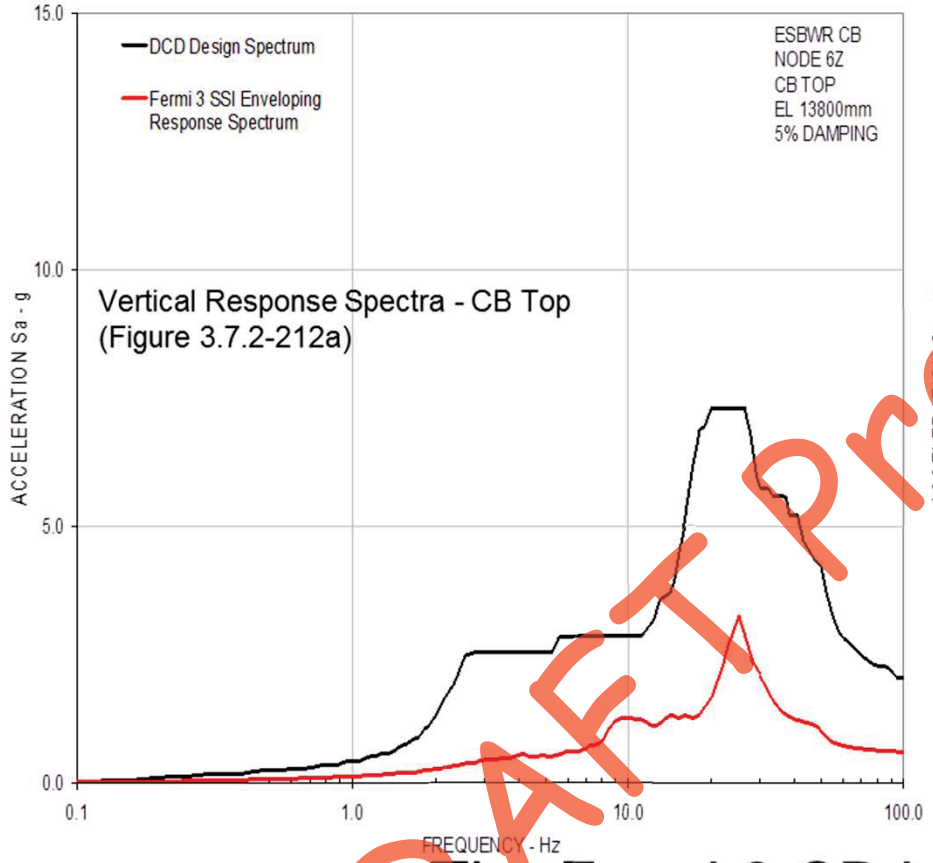
Section 3.7.2 – Conclusion (continued)

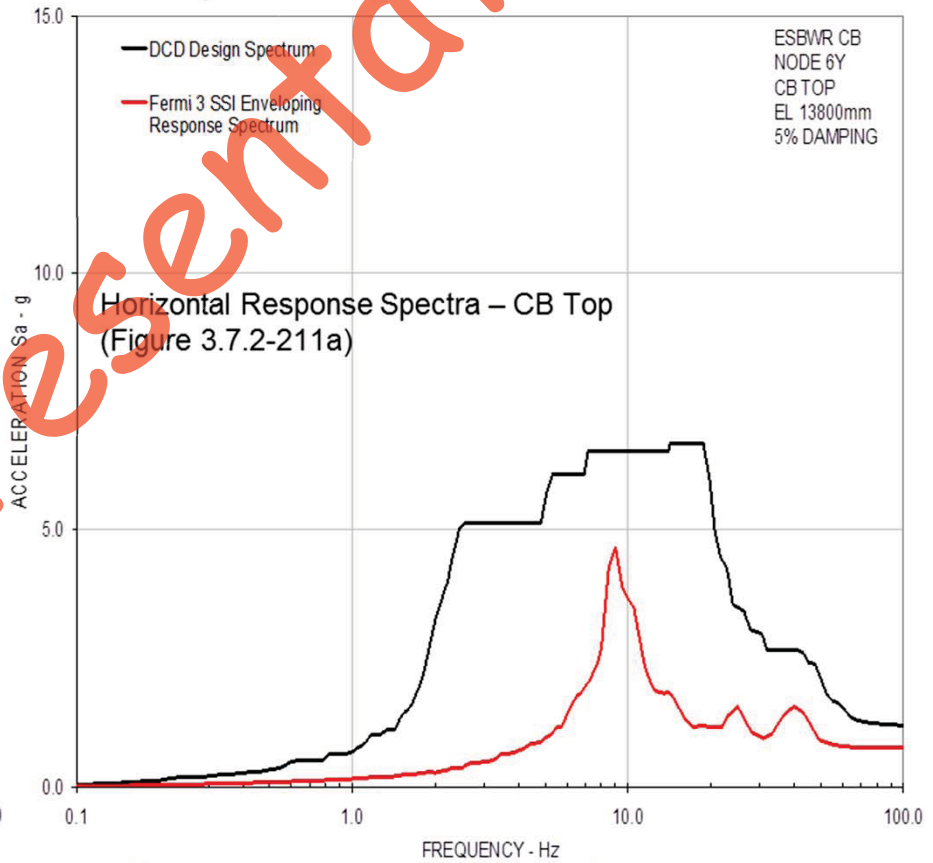


The Fermi 3 CB is well enveloped by the ESBWR CB standard plant design

Section 3.7.2 – Conclusion (continued)

Governing Comparison for Response Spectra





The Fermi 3 CB is well enveloped by the ESBWR CB standard plant design

Section 3.7.4 – Commitment

Seismic Instrumentation:

- The seismic monitoring program described in this subsection, including the necessary test and operating procedures, will be implemented prior to the receipt of fuel on site. (COM 3.7-001)

Section 3.8.4 – Purpose and Conclusion

Other Seismic Category I Structures:

- Lateral soil pressures from the applicable SSI and SSSI analyses were evaluated
- A quantitative assessment of the sidewall design was performed
- The induced out-of-plane bending moments and shear forces in the walls are enveloped by the ESBWR standard plant design

Section 3.8.5 - Conclusion

Foundations:

- Results from the Fermi 3 site-specific foundation stability evaluations demonstrated that the minimum factors of safety for sliding, overturning, and flotation meet SRP 3.8.5 requirements

- The Fermi 3 site-specific soil dynamic bearing demands are considerably below the allowable dynamic bearing capacities of the bedrock

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Fermi 3 COLA
Presentation to ACRS Subcommittee
Opening Remarks

Presentation Overview

Presenting summary information for Sections:

2.5 Geology, Seismology, and Geotechnical Engineering
3.7 Seismic Design
3.8 Seismic Category I Structures

Section 2.5

- Basic Geology and Seismic Information
- Vibratory Ground Motion (Central and Eastern U.S. Seismic Source Characterization [CEUS SSC] applied to establish site seismic response)
- Surface Faulting
- Stability of Subsurface Materials and Foundations
- Stability of Slopes

Presentation Overview

Section 3.7

- Developed Fermi 3 seismic inputs to support Soil-Structure Interaction (SSI) and Structure-Soil-Structure Interaction (SSSI) Analyses:
  - Partial Embedment of Seismic Category I Structures
  - Evaluate side backfill for Seismic Category I Structures as permitted by DCD
  - Used Direct Method where possible

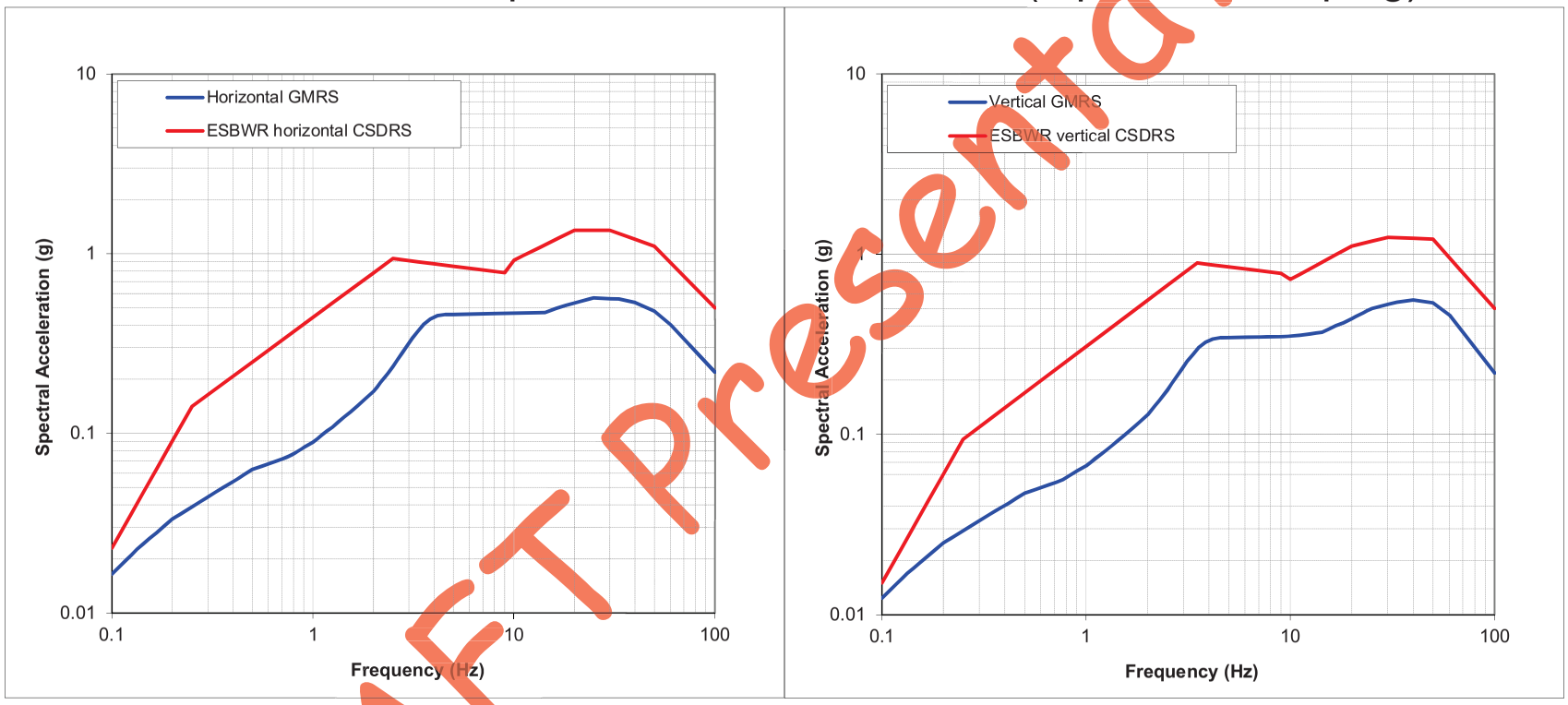
- Discuss results of SSI and SSSI

Section 3.8

- Discuss foundation stability and lateral soil pressures

Conclusion

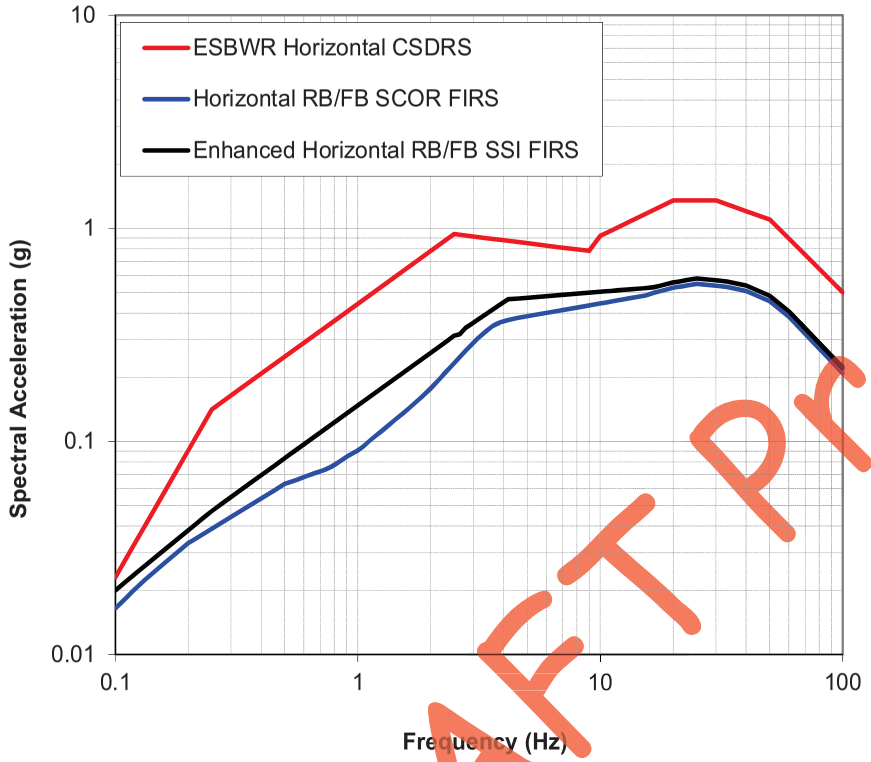
Fermi 3 GMRS compared to ESBWR CSDRS (5 percent damping)

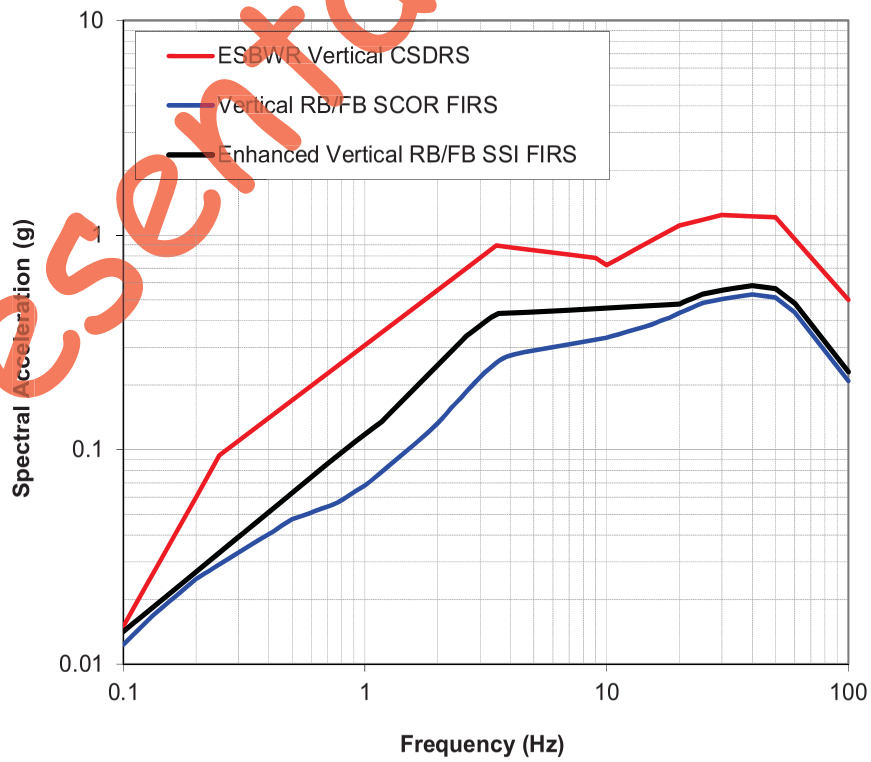


GMRS for Fermi 3 site is well enveloped by the ESBWR horizontal and vertical Certified Seismic Design Response Spectra (CSDRS)

Conclusion

Fermi 3 RB/FB FIRS compared to ESBWR CSDRS (5 percent damping)

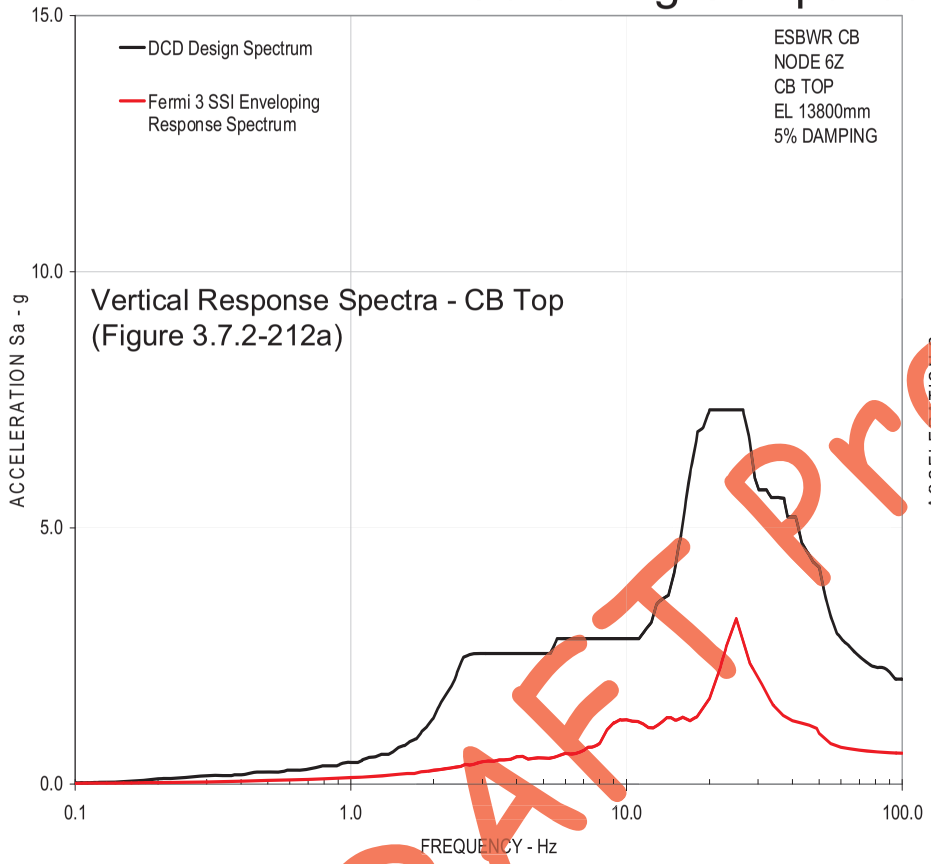


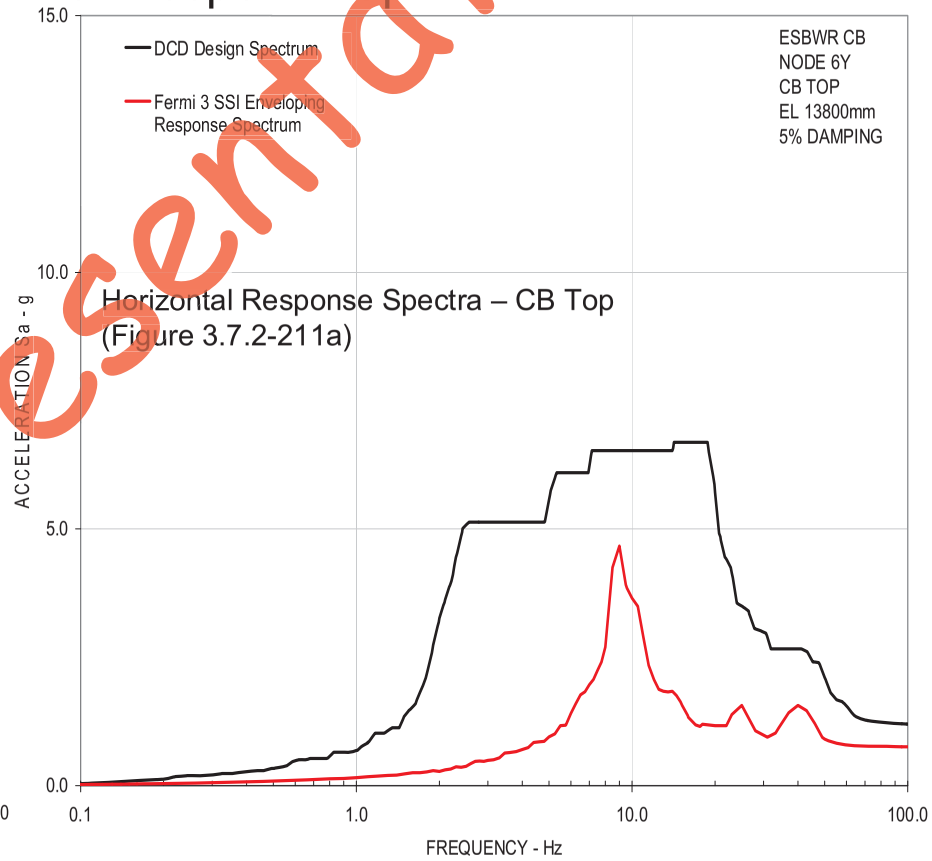


FIRS for Fermi 3 RB/FB, CB, and FWSC are enveloped by the ESBWR horizontal and vertical CSDRS

Conclusion

Governing Comparison for Response Spectra





Response spectra for Fermi 3 RB/FB and CB are enveloped by the ESBWR design response spectra

Conclusion

The Fermi 3 site is well enveloped by the ESBWR standard plant design