

Ma, John

From: Ma, John *NRO*
Sent: Friday, August 06, 2010 10:56 AM
To: 'hou chunlin'
Cc: Thomas, Brian; Tegeler, Bret
Subject: FW: One question from Chunlin (China NNSA)

Chunlin:

In order to answer your question, I must introduce some new terms, such as viscous damping and hysteric damping and explain what they are so that you will have a better understanding on the issue of damping and then on my answers. The damping in R.G. 1.60 and NUREG/CR-6919 is called viscous damping, that the damping force is proportional but opposite to velocity. Viscous damping occurs for the fluids in pistons, such as the shock absorbers for cars. In reality, structures do not have viscous damping. Major damping in structures are due to (1) molecular frictions in materials (concrete, steel, and wood)-hysteric damping (cyclic testing as the ones Westinghouse is doing for the SC modules) and (2) connection slippage and yielding. The reason for choosing viscous damping for structural dynamic analysis is simply due to mathematical convenience for solving dynamic responses of structures, because the damping force in the viscous damping theory can be represented by a damping constant multiply by the velocity of that mass and this equation is simple to perform mathematical calculations. Hysteric damping is real and can be converted into viscous damping, but the connection slippage and yielding are difficult to estimate and difficult to convert them into viscous damping.

With the above discussion, you should know now that the treatment of damping in structural analysis is simply a rough estimate and judgment is required to assess whether an adequate

From: Thomas, Brian
Sent: Friday, August 06, 2010 9:40 AM
To: Ma, John
Subject: FW: One question from Chunlin (China NNSA)

John,
Do you have a "quick, off the top of your head" response for Chunlin on her question below?

From: hou chunlin (b)(6)] EY 6
Sent: Friday, August 06, 2010 8:59 AM
To: Thomas, Brian
Subject: Re: One question from Chunlin (China NNSA)

Hi, Chief

I have one question, need you help.

Please give me some explanation.

Thanks

Regards

Chunlin

Information in this record was deleted in
accordance with the Freedom of Information Act.
Exemptions 6
FOIAPA 2010-0290

5/19

----- Forwarded message -----

From: **hou chunlin** (b)(6) Eyl
Date: Fri, Aug 6, 2010 at 5:15 PM
Subject: One question from Chunlin (China NNSA)
To: "Tegeler, Bret" <Bret.Tegeler@nrc.gov>

Bret,

How are you going ? I am Chunlin.

When I review the Rev.15 SB design, I have one question about the damping ration, as we know, RG1.61 Rev.1 "DAMPING VALUES FOR SEISMIC DESIGN OF NUCLEAR POWER PLANTS", In this Guide, Page 5, When mention the the Special Consideration for In-Structure Response Spectra Generation, it describes "For structural evaluation, this is not a concern, because the stresses resulting from the use of damping-compatible structural response will still be less than the applicable code stress limits, as defined in Section 3.8 of NUREG-0800 [Ref. 15]."

However, In NUREG/CR- 6919, In page 6, They tell" 2) If the significant stresses due to load combinations that include SSE are less than 80% of the applicable code stress limits, then using SSE damping levels may under-predict the structure's response to seismic loads. In this case, [redacted] and development of in-structure response spectra should be based on a seismic analysis utilizing the OBE damping values specified in Table 2."

There is some difference between RG1.61 and NUREG/CR-6919 on requiring Structural evaluation, If you have time and much more information on this thing, Please give me some suggestions.

Thanks!

Best of you !

Chunlin

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