

NRR-PMDAPEm Resource

From: WILLIAMSON, DANNY H <DWILL21@entergy.com>
Sent: Monday, January 25, 2016 2:10 PM
To: Hughey, John
Subject: [External_Sender] FLEX building seismic design
Attachments: RBS Storage Building Seismic Design Jan. 2016.pdf

John

Attached is an updated response to the request for additional information concerning the seismic design of our FLEX buildings. Give me a call if you have any further questions on this topic.

Hearing Identifier: NRR_PMDA
Email Number: 2632

Mail Envelope Properties (AB886B0D6516ED40B856643C503B23FC3417363E)

Subject: [External_Sender] FLEX building seismic design
Sent Date: 1/25/2016 2:09:37 PM
Received Date: 1/25/2016 2:09:44 PM
From: WILLIAMSON, DANNY H

Created By: DWILL21@entergy.com

Recipients:
"Hughey, John" <John.Hughey@nrc.gov>
Tracking Status: None

Post Office: LITXMETSP002.etrsouth.corp.entergy.com

Files	Size	Date & Time
MESSAGE	202	1/25/2016 2:09:44 PM
RBS Storage Building Seismic Design Jan. 2016.pdf		53877

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

RBS Storage Building Seismic Design

The River Bend Station (RBS) FLEX storage buildings were designed via the 2012 International Building Code (IBC). IBC invokes ASCE 7-10 throughout the document. The seismic design input spectra was obtained from ASCE 7-10 which is in accordance with NEI 12-06 Section 5.3.1.1.b. ASCE 7-10 provides a spectra with lower spectral accelerations than the RBS safe shutdown earthquake (SSE). Regarding the ability of the structure to resist plant SSE accelerations, the ASCE 7-10 based seismic reactions obtained from the FLEX storage building vendor were increased accordingly. In order to determine the acceptability of the existing design to the higher accelerations, these higher seismic reactions were then compared to the wind reactions.

The design input wind speed of 165 mph significantly exceeds the ASCE 7-10 requirements. A thorough review of the design determined that the reactions from the excess wind speed govern over SSE loading. The existing design is therefore acceptable.

The table below summarizes the governing design element (Braces) ratios between wind and SSE reactions. Note that the individual building frames and end wall members also have margin over SSE reactions beyond what is shown below.

Table 1: Wind and Seismic SSE Comparison for Governing Design Element

	Wind Reactions (kip)		SSE Reactions (kip)		Wind capacity over SSE forces (Wind reaction/SSE reaction)	
	Horiz.	Vert.	Horiz.	Vert.	Horiz.	Vert.
RBS North	12.9	8.8	4.9	3.3	2.6	2.7
RBS South	12.9	9.1	5.6	4.0	2.3	2.3

In order to account for varying soil conditions between the FLEX building sites and the plant (where the local soil profile was used to determine design accelerations), the largest Site Coefficient F_a in Table 11.4-1 of ASCE 7-10 for site class D is conservatively compared to the margin noted in the table above. Note that the coefficient F_a has a direct and linear effect on base shear (V). Therefore, magnifying the SSE forces by F_a will directly account for potentially varying soil properties through ASCE7's Class D, the most critical Class used for FLEX building design. Since the smallest margin above (2.3) is greater than 1.6, the building designs are acceptable for SSE accelerations conservatively magnified by local soil conditions.

The spacing around the equipment inside of the FLEX storage buildings was determined based on sliding and rocking distances during a seismic event also using the ASCE 7-10 seismic spectra. The sliding and rocking results for the equipment inside the FLEX storage buildings at RBS utilizing the seismic provisions of ASCE 7-10 are compared to the SSE seismic accelerations. The minimum separation distance between equipment specified utilizing the ASCE 7-10 seismic loads of 1'-3" is insufficient to bound the SSE loads for sliding and rocking and needs to be increased to 1'-6". The minimum separation note on the FLEX equipment layout drawings has been updated. The equipment was laid out with at least 24 inches of clearance so no physical changes are required.