

## **AP1000TopRptsPEm Resource**

---

**From:** Habib, Donald  
**Sent:** Friday, February 17, 2017 4:09 PM  
**To:** AP1000TopRptsPEm Resource  
**Subject:** AP1000 Specialized Seismic Option Report - Clarification and Audit Questions (Redacted)  
**Attachments:** Redacted for 2017-02-14 Teleconference - Draft Revised Questions 1and2 - Redacted.docx; Redacted for 2017-02-14 Teleconference - Requested Information for Effect of Power on ISRS Redacted.docx; Redacted 2017-02-14 Teleconference - Action Item 13 Redacted.docx

**Hearing Identifier:** AP1000\_TR\_RAI\_Public  
**Email Number:** 10

**Mail Envelope Properties** (6310785cc1604f248416f98458b983f5)

**Subject:** AP1000 Specialized Seismic Option Report - Clarification and Audit Questions  
(Redacted)  
**Sent Date:** 2/17/2017 4:08:40 PM  
**Received Date:** 2/17/2017 4:08:48 PM  
**From:** Habib, Donald  
**Created By:** Donald.Habib@nrc.gov

**Recipients:**  
"AP1000TopRptsPEm Resource" <AP1000TopRptsPEm.Resource@nrc.gov>  
Tracking Status: None

**Post Office:** HQPWMSMRS06.nrc.gov

Files	Size	Date & Time
MESSAGE	3	2/17/2017 4:08:48 PM
Redacted for 2017-02-14 Teleconference - Draft Revised Questions 1and2 - Redacted.docx		
25634		
Redacted for 2017-02-14 Teleconference - Requested Information for Effect of Power on ISRS		
Redacted.docx	20443	
Redacted 2017-02-14 Teleconference - Action Item 13 Redacted.docx		18798

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

Staff Feedback/Subsequent Questions on Westinghouse Response to RAI-SSO-009  
(Acceleration Time Histories for AP1000 SSO)

Questions 1 & 2, Revision 1

The staff's evaluation of Westinghouse's response to RAI-SSO-009, including confirmatory analysis of the acceleration time histories that WEC submitted previously, found some issues that require clarification and/or additional information for staff's assessment of the adequacy of the time histories, as follows.

1. The Fourier amplitude spectra of the design acceleration time histories were found to be [ ] and the Fourier phase spectra were [ ] in the [ ] frequency range. Similarly, the staff's raw PSD functions of the design acceleration time histories, estimated based on the [ ], are [ ] in the same frequency range as that for the Fourier amplitude spectra. In contrast, the raw PSD functions provided in the RAI response do not show [ ]. These do not appear to resemble the typical behavior of seismic motions and are not consistent with the intent of SRP guidance on using real earthquake records or random phases as seed record. Furthermore, the staff evaluated the Fourier spectra of the seed records, namely the [ ], and found that both the amplitude and phase spectra of the seeds do not show the behavior identified above for the design acceleration time histories. Therefore, Westinghouse is requested to explain these discrepancies (i.e., between the raw PSD functions and between the seed records and the design time histories), and as necessary, provide a technical basis to justify the adequacy of the design time histories for use in the design and analyses in the SSO, with respect to the aforementioned Fourier amplitude and phase spectra results.
2. The Westinghouse response to RAI-SSO-009 does not explain how it was shown that the PSDs, which were shown to be [ ], do not have [ ] at any frequency over the frequency range that is consistent with the ESS. The staff request Westinghouse to clarify how the PSDs were shown not to have [ ]. In addition, the staff found that the PSD functions provided in the RAI response appeared to be roughly [ ] times those calculated by the staff, which appears to be indicative of such factor being excluded from the denominator of Eqn. 1 of the RAI response. Therefore, Westinghouse is requested to clarify whether the [ ] factor in the denominator of Eqn. 1 of the RAI response was considered in the calculation of the PSD functions provided in the RAI response and correct any inconsistencies, as necessary.

## Requesting Information for a Confirmatory Analysis of the Effect of Power on ISRS

From the results of the confirmatory analysis of the design acceleration time histories, the staff has a concern on the power sufficiency of these time histories in the following frequency ranges:

- 1) above [            ] Hz in the Hor1 direction
- 2) above [            ] Hz in the Hor2 direction
- 3) above [            ] Hz and below [            ] in the Vert direction.

To address the concern identified above, the staff request Westinghouse to provide the following information to be used for a staff confirmatory analysis:

- (1) The NI10 model
- (2) The more refined models for the flexible floors where the following components and equipment are installed
- (3) A list of Seismic Category I components and equipment that have fundamental frequencies falling in the above frequency ranges. If no components and equipment are found in a frequency range, the list should include one component/equipment having its fundamental frequency closest to that frequency range. For each component identified, the list should include the following information: (a) name/type, (b) their fundamental frequencies, (c) the node number and nodal location where the component is installed.
- (4) ANSYS [            ] associated with the mode superposition time history analyses of the models identified in (1) and (2)
- (5) A description of the models and analysis procedures with sufficient details to help the staff to start the analysis quickly.

Feedback on WEC's response to RAI-SSO-001, Rev. 2:

Audit Action Item #13 indicates that WEC will "provide a physical explanation for the [ ]" During the June 2016 Audit, the staff noticed that based on comparisons of the ISRS, [ ]

[ ]. The response to RAI-SSO-001 in letter HSP\_NRC\_000028, dated December 16, 2016, provides a comparison of ISRS [ ] between two cases using [ ] for the Auxiliary Building. However, it does not include a comparison for the other three nodes at the top of the shield building. To close Audit Action Item 13, the staff requests WEC to provide the same comparison as shown in Figure RAI-SSO-001-17 for the other three nodes as well. The texts in Figure RAI-SSO-001-17 are not legible; in providing the information requested above, please improve the clarity of the texts in the figures.