

September 26, 2011

Via e-mail

Lawrence A. Salomone
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Savannah River Site
Building 730-4B, Room 3125
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Dear Mr. Salomone:

Reference: *Central and Eastern United States Seismic Source Characterization for Nuclear Facilities*: “Mandatory” PPRP Review Comments on the CEUS SSC Final Report

This letter constitutes the report of the PPRP¹ (“the Panel”) providing selected review comments from both Installments 1 and 2 of the *Central and Eastern United States Seismic Source Characterization for Nuclear Facilities, Final Report* (“the Final Report”). As you requested, the selected comments are those identified by the Panel as “mandatory”—that is, review comments that must be addressed by the TI Team in their final documentation of the Final Report. These comments were discussed with the TI Team in draft form at the PPRP Closure Briefing on September 7, 2011.

Background to our PPRP Review Comments on the Final Project Report

On August 5, 2011, we provided in draft form all of our Panel’s review comments on Installment 1 of the Final Report. Some of those comments were subsequently identified as mandatory and are now included in this formal PPRP report. The others have been incorporated into a separate PPRP Informal Communication that summarizes all of our Panel’s “non-mandatory” review comments on both Installments 1 and 2 of the Final Report. Our non-mandatory comments are intended chiefly to help improve the quality of the final product.

All eight members of the PPRP (J. P. Ake, W. J. Arabasz, W. J. Hinze, A. M. Kammerer, J. K. Kimball, D. P. Moore, M. D. Petersen, and J. C. Stepp) participated in this peer review, and the review comments represent the Panel’s consensus.

Our primary focus in reviewing Installments 1 and 2 of the Final Report has been: (1) to reach closure on comments made earlier on the Draft Report of July 2010; (2) to ensure that no substantive issues remain unresolved; and (3) to help the Project Team achieve a high-quality Final Report. Our overall evaluation of the CEUS SSC Project, including compliance with SSHAC guidance, will be addressed in our PPRP Final Letter Report in October 2011.

Kudos to the TI Team and Project Manager for the 2011 Version of the Project Report

The Panel praises the TI Team—and you as the Project Manager—for the impressive achievement of putting together the revised 2011 version of the Project report. We fully appreciate the massive amount of detail that had to be dealt with. Overall, the report is of high

¹ Participatory Peer Review Panel. For other acronyms, see the list of acronyms contained in the CEUS SSC Final Report.

quality, remarkably comprehensive, responsive to earlier PPRP review comments on the 2010 draft version, and clearly reflective of enormous efforts. The result is a high-quality project report that will support users' implementation of the CEUS SSC Model.

Please contact us if you have questions or need more information regarding the Panel's review comments.

For the PPRP,

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**MANDATORY PPRP COMMENTS ON CEUS SSC FINAL REPORT
(not ordered in priority)**

1. *How SSHAC Level 3 was Selected*

Although there is a comprehensive description of the use and difference between SSHAC Level 3 and 4 in Chapter 1, there are not explicit statements on why Level 3 was selected for the CEUS SSC Project, who made the decision, and at what stage in the project this was done. These are significant items of information that should be included. They are not discussed in Chapter 2.

2. *Identification and Engagement of Experts*

The report should provide additional discussion of how the spectrum of experts was selected for this project (several places within Chapter 2 and perhaps Chapter 1). While the report makes the point that all participants were reminded of their roles, and that many project participants have significant SSHAC experience, some could contend that this a closed process. Without additional discussion, the current text sounds like, “Trust us, we know what we are doing.” Specifically, we suggest a description of the steps taken by TI Team, as supported by the PPRP, to ensure that the participation of Resource Experts and Proponent Experts in Workshops #1 and #2 was appropriate and complete in order to be representative of the range of current scientific community interpretations, for which awareness and knowledge were required.

Additional discussion is required of the extended roles that certain resource experts played to develop explicit material for TI Team use (e.g., paleoliquefaction). Finally, the report should describe the extended role personnel from the U.S. Geological Survey (USGS) played in this project to ensure that all supportable interpretations of the scientific community were fully identified, evaluated and represented in the SSC model. Several USGS personnel provided detailed review and feedback on specific issues (e.g., the earthquake catalog, Mmax); these should be described.

3. *Weights to Logic Tree Branches*

Referring to the discussion in Section 4.1.1.2, while it is true that the final assignments of weights to logic tree branches are subjective, the report needs to make clear that the weights represent assessments informed by the totality of the SSHAC evaluation process. Before weights were assigned, the TI Team heard from a properly wide range of resource and proponent experts, reviewed extensive technical information, created the Data Summary and Data Evaluation tables, and evaluated a wide range of issues with members of the knowledgeable broader technical community. This is the critical message that needs to be emphasized for supporting the final informed subjective weights.

4. *CBR of the ITC vs. CBR of the TDI*

In the third sentence of Section 4.1.1.2 on p. 4-3, the text states that “the total set of logic tree branches and weights represent [sic] the team’s assessment of the center, body, and range of views of the informed technical community (see Section 2.1 for a discussion of this concept).” In Section 2.1, however, the reader was informed of proposed alternative wording referring to “the CBR of the ‘technically defensible interpretations’ (TDI), instead of CBR of

the ITC” citing the NRC (in review). If TDI is preferred, replace “of the informed technical community” with “of the technically-defensible interpretations.”

In Section 2.1, in discussing the alternative wording of the TDI to replace the ITC, care should be taken to avoid the notion that “nothing has changed by way of perception of process; we have just used more acceptable wording.” The text should convey that the change does indeed grow out of a deeper understanding of the process and is a more clear expression of the fundamental concept that the SSHAC intended to convey.

5. *Evaluation of Cases A, B, and E*

In Section 7.5.1 (*Rate and b-Value Maps for Single Zone and Two Zones*), the bases for the three choices of magnitude weights represented by Cases A, B, and E, are discussed, but there is almost no discussion of the bases and considerations that went into the evaluation and integration that resulted in the assessed weights. Keeping in mind that observed seismicity is a direct measure of tectonic strain release and that the smoothing procedure is a tool for representing the TI Team’s evaluation of this process—including issues such as uncertainty about spatial stationarity of seismicity in space and time, uncertainty imposed by the limited observed record of earthquakes, as well as other uncertainties cited in Chapter 5 of the report—the report needs to clearly convey the Team’s evaluation and integration activities that resulted in the weights on Cases A, B, and E as properly representing the TDI.

Added commentary: The following two comments on Chapter 8 are related to an understanding of the implications of weighting Cases A, B, and E.

- 1) The Central Illinois Site shows significantly higher hazard than from the COLA or USGS models (Figure 8.2-1j). It seems like the primary contributor is the IBEB source zone. Why is the seismicity rate high in this zone compared to the catalog used in the 2008 USGS maps?
- 2) For the Chattanooga site, Figures 8.2-2j to 8.2-2l show similar hazard between the USGS and CEUS SSC models for ground motion less than about 0.6 g for 10 Hz. However, for higher ground motions the curves diverge. For 1 Hz the USGS model is consistently higher than the CEUS SSC model. Is this difference because of the Eastern TN Seismic Zone, the Mmax distribution, or something else? This is the only site where the contribution from the Eastern TN Seismic Zone can be checked—hence, the interest in scrutinizing whether the CEUS SSC and USGS models are similar, or else the differences explained.

Lack of table defining Cases A, B, and E: The description of smoothing in Chapter 5 is well written. One lapse is that the report presently lacks a defining table for Cases A, B, and E for the weighting of magnitude bins—clearly a critical part of the report documentation. The discussion of weighting of magnitude bins begins in Section 5.3.2.2.1 on p. 5-36, and the reader is referred to Table 5.3.2.1 [sic]. Table 5.3.2-1 includes no information on Cases A, B, C, D, and E discussed in the text. This same table is also referenced in Section 5.3.2.6, pointing the reader to Cases A, B, and E.

6. *Appendix A — Description of the CEUS SSC Project Database*

One PPRP member who has special expertise relating to the subject matter of Appendix A has made extensive efforts in reviewing both the July 2010 draft version of this appendix and the June 2011 revision to help improve its accuracy and technical quality. We urge diligent attention to the totality of the review comments on Appendix A in our companion *non-mandatory* PPRP review comments. The following items of response are judged to be of greatest importance:

- Item (e) in Comment **(FR) S A-1** regarding incorrect units on some of the figure legends must be dealt with because the units are incorrect.
- Comment **(FR) S A-2** (*Lack of Suitable Information on Regional Heat Flow*) is important because of the role of these data in processes and seismogenic crustal thickness of the CEUS.
- Comments **(FR) CC A-5, A-6, and A-8** relating to Figures A-13, A-14, and A-16, respectively, point out some basic problems with these figures.

7. *Region of Applicability of the SSC Model*

In the first sentence of Section 1.3, the statement, “The SSC model developed for this project is applicable to all sites within the project study region (Figure 1.3-1)” needs to be clarified. Sites within some distance (to be defined) of the boundary of the “study region” will require a site-specific SSC model that extends beyond the region boundary. A distinction must be made between “study region” and the region of applicability of the SSC model without the need to extend the model beyond the study region.

8. *AFEs for Nuclear Facilities*

In the second paragraph of Section 1.1.5, PSHAs for nuclear facilities must extend from 10^{-3} through 10^{-7} AFE (see also Section 2.4.2).

Various sections of the report should be consistent in specifying this range of importance of AFEs for nuclear facilities; in Chapter 9, added wording should explain the focus on AFEs of 10^{-4} to 10^{-6} for COVs.