May 19, 2008

Mr. Gregory Gibson, Manager
Regulatory Affairs
STP Nuclear Operating Company
P. O. Box 289
Wadsworth, TX 77483

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION LETTER NO. 50 RELATED TO THE SRP SECTION 02.05.02 FOR THE SOUTH TEXAS COMBINED LICENSE APPLICATION

Dear Mr. Gibson:

By letter dated September 20, 2007, STP Nuclear Operating Company (STPNOC) submitted for approval a combined license application pursuant to 10 CFR Part 52. The U. S. Nuclear Regulatory Commission (NRC) staff is performing a detailed review of this application to enable the staff to reach a conclusion on the safety of the proposed application.

The NRC staff has identified that additional information is needed to continue portions of the review. The staff's request for additional information (RAI) is contained in the enclosure to this letter.

To support the review schedule, you are requested to respond within 45 days of the date of this letter. If changes are needed to the safety analysis report, the staff requests that the RAI response include the proposed wording changes.

If you have any questions or comments concerning this matter, I can be reached at 301-415-1494 or by e-mail at George.Wunder@nrc.gov.

Sincerely,

/RA/

George F. Wunder, Senior Project Manager
ESBWR/ABWR Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

Docket Nos.: 52-012
52-013

eRAI Tracking No. 212

Enclosure:
Request for Additional Information

cc: William Mookhoek

If you have any questions or comments concerning this matter, I can be reached at 301-415-1494 or by e-mail at George.Wunder@nrc.gov.

Sincerely,

/RA/

George F. Wunder, Senior Project Manager
ESBWR/ABWR Projects Branch 2
Division of New Reactor Licensing
Office of New Reactors

Docket Nos.: 52-012
52-013

eRAI Tracking No. 212

Enclosure:
Request for Additional Information

cc: William Mookhoek

Distribution:
PUBLIC
NGE 1/2 R/F
BSosa
GWunder, NRO
YLi, NRO
JBiggins, OGC
RidsNroDsraSbpb
RidsNroDnrlNge2

ADAMS Accession No. ML081420041 NRO-002

OFFICE	DSER/RGS2	DSER/RGS2/BC	OGC	NGE1/L-PM
NAME	YLi	RKaras	JBiggins	GWunder
DATE	04/28/2008	05/13/2008	05/15/2008	05/19/2008

***Approval captured electronically in the electronic RAI system.**

OFFICIAL RECORD COPY

Requests for Additional Information
South Texas Project Units 3 and 4
South Texas Project Nuclear Operating Co.
Docket Nos. 52-012 and 52-013
SRP Section: 02.05.02 - Vibratory Ground Motion
Application Section: 2.5

QUESTIONS

02.05.02-1

Equation 2.5S.2-3 shows how magnitude uncertainty, sigma(mb), was used to compute uniform, unbiased magnitudes. Section 2.5S.2.1.2 states that sigma(mb) was estimated for each earthquake in the updated catalog, but does not describe how sigma(mb) was estimated. Please explain the method used to estimate sigma(mb).

02.05.02-2

The original EPRI/SOG report (Reference 2.5S.2-3) recommends Equation 4-2 (FSAR Equation 2.5S.2-3) for computing uniform magnitudes "when mb is determined through conversion from other size measures," but a different equation, Equation 4-3 in the original EPRI/SOG report, when mb "is determined directly from instrumental data" – presumably the case for most of the updated catalog. Please explain why you used Equation 4-2 to compute uniform magnitudes for the post-1984 earthquakes instead of Equation 4-3.

02.05.02-3

In Section 2.5S.2.1.3, you used Equation 2.5S.2-4 to convert Ms to mb for the Gulf of Mexico earthquakes. Please provide a reference for the equation, and explain why you used a different approach to convert Ms to mb for the post-1984 catalog (Ms to M to mb, as described in Section 2.5S.2.1.2).

02.05.02-4

Please explain why you applied different declustering criteria to the two parts of the updated seismic catalog (Gulf of Mexico and post EPRI SOG for the rest of the study area). Please describe the approach or algorithm used to decluster the updated Gulf of Mexico catalog, and explain what is meant by "guided by the EPRI characterization of MAIN vs. non-MAIN, as well as by apparent spatial and temporal similarity between events, dependent events were identified and removed" (FSAR Section 2.5S.2.1.3).

02.05.02-5

Based on Section 2.5.S.2, EPRI Earth Science Teams (EST) either assigned very low maximum magnitudes or low probabilities of activity to the source area located in the northwest corner of the Site Region. This has resulted in this source area contributing little to the site total seismic hazard (less or equal to 1%, see Figure 2.5 S 2-8). Please explain whether or not the Johnston (1994) findings, the final versions of the Kanter (1994) assessments, and USGS's use of them as support for an Mmax of 7.0 constitute new information that requires an update of 1989 EPRI source model.

02.05.02-6

In Section 2.5S.2.1.5, you developed a new earthquake-detection probability matrix and catalog-completeness model for the Gulf of Mexico region. You based its analysis on the assumption that earthquake detection probabilities for a given magnitude increase with time. Please explain how you can confirm that local and regional seismograph coverage in the study region was experiencing improvement or was at least stable during the time period of the analysis?

02.05.02-7

In section 2.5S.2.1.5, you assumed that the seismic activity of two regions (the Gulf of Mexico and CEUS) are similar by replacing the calculated b value of 0.5 from the Gulf of Mexico seismic catalog with the b value 1.0 from the CEUS. What is the basis for this assumption?

02.05.02-8

The caption for Figure 2.5S.2-7 cites Reference 2.5S.2-3 as the source for the southern boundary of the EPRI incompleteness regions. Judged by its shape, however, the boundary plotted in Figure 7 appears different than the boundary plotted in Figure 4.4 of the cited reference. Please reconcile the apparent differences in the plotted boundaries.

02.05.02-9

Section 2.5S.2.1.5.1 describes the mild ground motion effects observed in Texas from the 1985, Mw 8.0 Michoacan earthquake, and states that this has been the largest event in a century along this part of the Pacific plate boundary. This earthquake was roughly the same distance from the site as the New Madrid seismic zone. Please describe the potential for larger and/or closer Pacific plate-boundary earthquakes and the expected ground motion effects at the site, and how these remote sources will affect the site-specific GMRS.

02.05.02-10

Section 2.5S.2.2.8 discusses the USGS seismicity source models. Contrary to the “small number of sources” described by the applicant, the USGS models use hundreds of gridded seismicity sources in the site region, organized by completeness criteria into several spatially detailed source models that reflect local historical rates of seismic activity. Please reconcile the published descriptions of the USGS seismicity source models with the descriptions given in Section 2.5S.2.2.8.

02.05.02-11

Section 2.5S.2.4.1 describes seismic sources used from the Bechtel Earth Science Team to calibrate its software and modeling parameters in trying to reproduce the 1989 EPRI results. You indicated that the results of this comparison are different depending on the EPRI ESTs. Therefore, listing only the Bechtel calibration result in Table 2.5 S.2-14 does not validate the calibration. Please provide detailed calibration results for the validation process.

02.05.02-12

According to Section 2.5 S.2.4.1, there are two sources, 124 and 126, from the Law Engineering Team, which contributed 99% of the total seismic hazard to the site (Figure 2.5S.2-3). Source 126 covers the STP COLA site with a maximum magnitude (mb) distribution of 4.6 (0.9) and 4.9 (0.1). The closest distance from source 124 to the site is about 124 km and the magnitude distribution is 4.9 (0.3), 5.5 (0.5) and 5.8 (0.2). Please explain why the published EPRI hazard results “are not low” in comparison to the results from other ESTs.

02.05.02-13

In Section 2.5 S.2.4.3, you described the update of EPRI seismic source maximum magnitudes (Mmax). Please describe the procedure you used to revise the EPRI SOG source parameters. Please specifically address whether the revision is a SSHAC process and if so what level it is(the EPRI SOG source characterization process was equivalent to a SSHAC level 3-4 study)? If a SSHAC process was not used, please justify and fully describe the alternate process.

02.05.02-14

In Section 2.5S.2.4.4.1, you stated that “Subsurface structure, imaged by seismic reflection data, indicates that the MEEG is rooted in the Jurassic Louann Salt at maximum depths of 4.5 to 6 km. This suggests that late Quaternary displacement and contemporary creep across the MEEG may be driven by the movement of salt at depth, indicating that the fault is not accommodating tectonic deformation and thus is not an independent source of moderate to large earthquakes.” a) Please explain why the nature of the loading mechanism (salt movement rather than tectonic forces) alone disqualifies the MEEG as a seismic source. Specifically, describe the potential for the ability of the structure (also growth faults?) to accumulate stress, rather than the nature of the loading? b) Please explain why the much-lower, long-term separation rate based on offset Quaternary gravels is used in the sensitivity modeling for the MEEG (Section 2.5S.2.4.4.1), rather than the higher rate that “likely reflects movement of salt at depth and is not indicative of the rate of tectonic strain accumulation.”

02.05.02-15

Paleoliquefaction features in southeastern Arkansas and northeastern Louisiana indicate that previously unrecognized seismogenic sources may exist in those areas (e.g., Al-Shukri et al, 2005; Cox et. al., 2004; Tuttle et. al., 2006). Please explain or justify whether these sources could potentially impact the seismic hazard determined for the STP site. References "Spatial and temporal characteristics of paleoseismic features in the southern terminus of the New Madrid Seismic Zone in eastern Arkansas," Seismological Research Letters, Volume 76, Pages 502-511, Al-Shukri, H. J., Lemmer, R. E., Mahdi, H. H., Connelly, J. B., 2005. "Preliminary assessment of sand blows in the southern Mississippi Embayment," Bulletin of the Seismological Society of America, Volume 94, Pages1125-1142, Cox, R. T., Larsen, D., Forman, S. L., Woods, J., Morat, J., and Galluzzi, J., 2004. "Very large earthquakes centered southwest of the New Madrid seismic zone 5,000-7,000 years ago," Seismological Research Letters, Volume 77, Pages 755-770, Tuttle, M. P., Al-Shukri, H., Mahdi, H., 2006.

02.05.02-16

Provide boundary coordinates and mean hazard curves (1, 2.5, 5 and 10 Hz) for those source zones whose combined hazard contribution exceeded "99%" of the total hazard, from each of the six EPRI-SOG Earth Science Teams.

02.05.02-17

Section 2.5S.2.5.2, "Seismic Wave Transmission Characteristics of the Site," used generic curves from the EPRI report (1993) and did not use the Resonant Column/Torsional Shear (RCTS) data in the site-specific response analyses. The limited soil degradation curves from five samples deviate from the generic EPRI curves at close to 0.01% strain level ("approximately 0.02% level," according to your description) for the subsurface soil layers of M and N (load bearing layers). Therefore, the GMRS may not necessarily reflect the site–specific soil dynamic properties without incorporating sufficient site-specific RCTS test results. Please incorporate sufficient RC/TS test results into the GMRS calculation to characterize the site-specific soil dynamic properties.

02.05.02-18

Section 2.5S.2.5.4 states that Random Vibration Technology (RVT) was used to analyze soil amplification at the ground surface, but how the method was used to calculate the soil amplification using the input motion was not detailed. Please provide a step-by-step description on how you used Random Vibration Technology to calculate soil responses at the STP COLA site, including input parameters and modeling assumptions, so that the staff can verify the method and input and output parameters.