

April 7, 2005

MEMORANDUM TO: File

FROM: Christian Araguas, General Engineer */RA R. Anand for:/*
New, Research and Test Reactors Program
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF FEBRUARY 24, 2005 TELEPHONE CONFERENCE
CALL WITH SYSTEM ENERGY RESOURCES, INC. (SERI).

This memorandum documents the results of a telephone conference between the NRC staff and SERI on February 24, 2005.

Attachment 1 contains a summary of the call. Attachment 2 contains a list of staff comments and additional questions regarding SERI's Request For Additional Information (RAI) responses which were discussed during the call.

Docket No. 52-009

Attachments: As stated

cc: Y. Li
T. Cheng

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Telephone Call Summary

Subject: Systems Energy Resources, Inc. (SERI) Early Site Permit (ESP) Draft Safety Evaluation Report (DSER) Discussion On Responses To Requests For Additional Information (RAI)

Date of Call: February 24, 2005

Participants

Nuclear Regulatory Commission

J. Segala
Y. Li
T. Cheng
C. Araguas

Applicant

G. Zinke
M. Bourgeois
W. Lettis
J. Hengesh
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Referenced documents

<u>Accession Number</u>	<u>Title</u>	<u>Date</u>
ML043520051	Response to Request for Additional Information [RAI] Letter No. 5 - System Energy Resources, Inc., Early Site Permit Application for the Grand Gulf ESP Site (TAC NO. MC1378)	12/10/2004

Discussion

The purpose of the conference call, which was held at the request of the U.S. Nuclear Regulatory Commission (NRC) staff, was to discuss information submitted by SERI in support of its ESP application. Specifically, the staff and SERI discussed remaining issues that the staff had in regards to the responses SERI provided to the RAIs generated from the Grand Gulf ESP application.

During the February 24 conference call, the staff provided the applicant with a set of questions and comments generated from the applicant's RAI responses. The staff reviewed both the questions and comments with the applicant before any discussions began. The following is a list of what was discussed and the approach the applicant plans to take to resolve these issues.

- Comment 2.5.4-1: In reference to RAI 2.5.4-1, the applicant stated that additional clarification will be added to the Supplemental Safety Analysis Report (SSAR) which will address the impacts associated with the proposed new foundation depths, including a general statement of construction methods and affects on setbacks.

- Comment 2.5.4-2: In reference to RAI 2.5.4-3, the applicant stated that additional clarification will be added to the SSAR in response to this comment.
- Comment 2.5.4-3: In reference to RAI 2.5.4-4, the applicant stated that additional clarification will be added to the SSAR in response to this comment.
- Comment 2.5.4-4: In reference to RAI 2.5.4-11, the applicant stated that additional clarification will be added to the SSAR text in response to this comment.
- Comment 2.5.4-5: In reference to RAI 2.5.4-14, the applicant stated that additional clarification will be added to the SSAR text in response to this comment.
- Comment 2.5.4-6: In reference to RAI 2.5.4-5, the applicant stated that it will add tables of strain compatible shear-wave damping and velocities resulting from the 1 to 2 Hz and 5 to 10 Hz scaled spectra site response analyses for the relevant case which has the top 50 ft of loess removed.
- Comment 2.5.5-1: In reference to RAI 2.5.5-1, the applicant stated that additional clarification will be added to the SSAR text in response to this comment. Please refer, however, to RAI Figure 2.5.5-1-1 for a true scale (i.e., no vertical exaggeration) cross section of the site.
- COL Comment 2.5.4-1: In reference to RAI 2.5.4-2, the applicant stated it agrees with the comment and will make appropriate changes.
- COL Comment 2.5.4-2: In reference to section 2.5.4.3, the applicant stated it agrees with the comment. No revisions required.
- COL Comment 2.5.4-3: In reference to potential excavation procedures, impact of the adjacent bluff on temporary support conditions, and how this may impact standoff distances in the ESP area, the applicant stated it agrees with this comment. The appropriate changes will be incorporated.
- COL Comment 2.5.4-4: In reference to RAI 2.5.4-9, the applicant stated it agrees with this comment.
- COL Comment 2.5.4-5: In reference to section 2.5.4.6, the applicant stated it agrees with this comment.
- COL Comment 2.5.6-1 The applicant stated it agrees with this comment. No revision required.
- Confirmatory Comment 2.5.4-1: The applicant agrees with the comment and will make the appropriate changes.
- Confirmatory Comment 2.5.4-2: The applicant agrees with the comment and will make the appropriate changes.

- Question 2.5.4-1: In reference to RAI 2.5.4-1, the applicant agrees with the question and will incorporate the necessary changes.
- Question 2.5.4-2: The applicant provided a response that the staff is still reviewing.
- Additional Question 1: In reference to Page 2.5.67, the applicant was asked to provide references for data provided in the SSAR. The applicant discussed the references and proposed to revise the SSAR to further clarify the issue.
- Additional Question 2: In reference to SSAR figure 2.5-59, the applicant was asked to explain specific data points on the figure. The applicant will provide an explanation for staff review.

Grand Gulf ESP Comments

Comment 2.5.4-1

In RAI 2.5.4-1, the staff requested the applicant to (1) provide basis for categorizing the relatively shallow component of the deep profile as bedrock as opposed to dense sands and gravels, and (2) evaluate the impact of describing the formation as Abedrock as opposed to dense sands and gravels in the various site elevations. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the revised material descriptions for the site indicate a change from the term "Catahoula bedrock" used in the UFSAR to dense sand and gravels in the current descriptions. The information from both the previous extensive site studies described in the UFSAR as well as the limited ESP investigation indicate that the foundation soil properties are consistent and that these soils are stiff enough so as to not impact evaluations of settlement and required strength. The change in nomenclature is indicated to not have any significant impact on findings in the UFSAR and the SSAR. The details provided with this response are considered appropriate as a response to this RAI. However, it is noted that the applicant's response indicates that the depth of new Category I foundations may have to be located lower than the current Grand Gulf foundations for equivalent behavior to be anticipated. This may have significant impact on construction procedures anticipated for the site and needs to be further clarified.

Comment 2.5.4-2

In RAI 2.5.4-3, the staff requested the applicant to indicate the additional information available for the Grand Gulf Nuclear Plant site to allow characterization to the deeper depths required for the site response. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the new borings and cone penetrometers taken as part of the ESP investigation present site specific information to a maximum depth indicated to be about 73.15 m (240 ft). In the soil profiles developed for the ESP site (Figures 2.5.4-1 and 2.5.4-2 [SSAR Figures 2.5-30 and 2.5-31]), the applicant provided descriptions developed from previously available site investigations. The response includes a general description of the additional geotechnical information available from the UFSAR program that overlaps the ESP area and that was used in the evaluation of the ESP site to relatively shallow depths. The applicant also indicated that they specifically developed the ESP site investigation program to obtain sufficient information to characterize the site subsurface conditions and soil variability that may influence ground motion response. However, as discussed above, all site-specific information obtained for the site was limited to only about 91.44 m (300 ft) of depth and detailed information throughout the additional depth of the soil column was not obtained for this evaluation. In addition, the number of borings available for the site from which to assess site variability, particularly at the deeper depths, and its impact on site response was considered insufficient to characterize the site unambiguously as required in Section 2.5.4.1 of RS-002.

Comment 2.5.4-3

In RAI 2.5.4-4, the staff requested the applicant to provide the basis for selecting this generic base case velocity model over any other model that may be generated from available information for the site and its environs. From its review of the applicant's response as

summarized in Section 2.5.4.1.2 of this report, the staff found that several unresolved issues remain to address the adequacy of the computed surface response spectrum as a site-specific evaluation. First, comments are provided by the applicant in their response to this RAI to indicate that the site stratigraphy is slowly varying across the entire region from the Gulf Coast to well north of the Memphis area. The applicant did not provide, either in the SSAR or in their response to this RAI, the basis for making this evaluation. The response indicates that these decisions are based on the use of old well logs to make judgments of regional stratigraphy. However, the applicant did not discuss the appropriateness of using such information to make judgments on shear wave velocities at depth. The range in wave velocities for the deep profile considered in the sensitivity study provided in the response varies from about 231.36 m/sec (700 fps) to 762 m/sec (2,500 fps) at a depth of 1 km (0.62 mile). The staff's concern rests with the selection of this range in velocities. The applicant's response does not indicate the basis for these bounding values, nor the sensitivity of the computed responses to velocity values outside this range at the depth of about 1 km (0.62 mile).

However, the applicant stated the following in Section 2.5.1 about the level of uniformity in the site area. Holocene alluvial and deltaic deposits thicken from a few tens of feet in the northern portion of the site region to greater than 183 m (600 ft) in the southern portion of the site region. In the site vicinity, the thickness of Holocene deposits in the Mississippi Alluvial Valley is on the order of 0 to 122 m (400 ft) thick. As an aside, the applicant computed the median amplification factors on the basis of the 1-2 Hz scaled bedrock motion. The corresponding responses for bedrock motions scaled to the UHS at the 5-10 Hz frequency range along with enveloping of the computed amplification factor sets is not provided.

Of additional interest is the development of the material damping factors used in the site response calculations generated from the estimated kappa values chosen. The applicant did not discuss the uncertainty in the selection of the kappa value nor the issue of effective scattering kappa incorporated into the models by the site layering and their impact on effective low strain damping selected for the models. The applicant should address the issue of sensitivity of the computed site response to the assumptions made to characterize the deep site profile.

Comment 2.5.4-4

In RAI 2.5.4-11, the staff requested the applicant to evaluate the impact of the velocity cutoff on the minimum depth for future siting, especially since the staff qualified all of the advanced reactor designs by requiring shear velocities of at least 304.8 m/sec (1,000 fps). From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the applicant agrees with the observation that S-wave velocities measured at the ESP site fall below the target velocity of 304.8 m/sec (1,000 fps) at depths below those indicated in the SSAR to be probable depths of new foundations. The applicant's response also refers to these low velocity zones at depth as "localized" zones. Since only three borings are available for the ESP site evaluation, one may find the S-wave velocity in these "soft" zones to be even lower during the detailed site investigations to be conducted during the COL stage. The applicant should revise the SSAR to clearly indicate the potential depths of foundations of safety-related facilities and the evaluation program needed to evaluate any new facility founded above such "soft" zones.

Comment 2.5.4-5

In RAI 2.5.4-14, the staff requested the applicant to (1) provide the basis for making the statement that the shear wave data was of excellent quality in the three boreholes, (2) indicate that the statement applies equally well to the quality of the corresponding P-wave profiles and (3) explain the cause of the difference in P-wave velocity changes at elevation near the water table between boreholes. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the explanations provided by the applicant with respect to the quality of P- and S-wave data is considered adequate since (a) the process used to generate wave velocities used multiple measurements and (b) the process was independently reviewed. However, the basis for the statement associated with the rise and fall in P-wave data in boring WLA B-2A needs to be clarified in the SSAR. The response also indicates that the process used to advance the borings precluded obtaining good information on ground water depths. Although the potential of encountering a perched water table appears reasonable, the uncertainty in the ground water data cannot be used to support the supposition. The applicant needs to clarify the response to this RAI and to incorporate them into the SSAR.

Comment 2.5.4-6

In RAI 2.5.4-5, the staff requested the applicant to indicate the values of the BE, UB and LB velocities selected for each primary component of the profile and to provide bases for their selection in either SSAR Section 2.5.4 or SSAR Section 2.5.2. From its review of the applicant's response as summarized in Section 2.5.4.1.3 of this report, the staff found that the response provided by the applicant does not indicate the implementation of the randomization scheme used in the response calculation. For example, it is typical to specify not only the best estimate velocity profile, but also the corresponding plus/minus one sigma values of log shear wave velocities for the entire site column above hard rock, from which the randomization scheme can move forward. The basis for the selection of such profile properties needs to also be provided in the SSAR.

Comment 2.5.5-1

In RAI 2.5.5-1, the staff requested the applicant to perform an evaluation to demonstrate the expected behavior of the loess escarpment or the extent to which such movements will not occur. In its response to RAI 2.5.5-1, the applicant indicated that they modified the ESP site plan to restrict the location of the PPBA to a distance of over 30.48 m (100 ft) from the bluff area on the west side of the site. They also indicate that based on a qualitative assessment of stability, the hazard to the ESP site from potential future movements of the loess soils is very low to nil. However, this qualitative assessment was based on potential failure plane relationships and did not consider the potential impact of differences in elevations on SSI evaluations of safety-related facilities.

COL Comment 2.5.4-1

In RAI 2.5.4-2, the staff requested the applicant to describe the character of the fill material and controls, if any, that were placed on the fill at the time of their deposition. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the applicant indicated that they filled the original southwest trending swales that existed in the area

during the site grading associated with the prior development of the GG site. The fill placed at that time brought the ESP area to its current configuration. The applicant further indicated that the current state of the fill is relatively loose with measured SPT blow counts in the range of 5 to 7 blows per foot. Grain size characteristics of this fill are unknown but no unusual behavior has been noted over the years since its original placement. Since this material does not extend to significant depths, it was indicated that this fill would not impact foundations of any power block facilities to be constructed in the area. The procedure used by the applicant is consistent with industry practice and is acceptable. In the response, the applicant indicated that they will update the SSAR to include these revised descriptions. The applicant also indicated that the COL applicant will conduct detailed studies of the fill material and the required treatment during the COL stage.

COL Comment 2.5.4-2

Section 2.5.4.3 in RS-002 directs the staff to compare the applicant's plot plans and profiles of all seismic Category I facilities with the subsurface profile and material properties. Based on the comparison, the staff can determine if (1) the applicant performed sufficient exploration of the subsurface materials and (2) the applicant's foundation design assumptions contain adequate margin of safety. On this basis, the staff finds the applicant's description of the relationship of foundations and underlying materials acceptable. The applicant plans to provide this information as part of its COL submittal. Submission of the applicant's plot plans and profiles of all seismic Category I facilities for comparison with the subsurface profile and material properties is a COL Action Item.

COL Comment 2.5.4-3

The staff notes that the applicant should evaluate, during the COL stage, potential excavation procedures that may be used as well as impact of the adjacent bluff on temporary support conditions and how this may impact standoff distances in the ESP area.

COL Comment 2.5.4-4

In RAI 2.5.4-9, the staff requested the applicant to provide basis for indicating that the Grand Gulf ESP site is not susceptible to potential long-term problems such as dissolution cavities and/or sinkholes. From its review of the applicant's response as summarized in Section 2.5.4.1.4 of this report, the staff found that karst formations as indicated by the applicant are probably not of concern in the calcareous clays and limestone deposits at the site. However, the applicant further indicated that additional site investigations would need to be conducted during the COL phase of the nuclear project including deep borings in the footprint of the power block structures. To properly evaluate this potential during the COL stage, the future performance of the boring program needs to evaluate the potential for such karst formation in addition to other requirements described in RG 1.132 and documented in the SSAR.

COL Comment 2.5.4-5

In SSAR Section 2.5.4.6, the applicant indicates that specific design criteria will be developed during the COL stage when the specific characteristics of the operating system will be known.

Design criteria associated with structural design such as potential wall rotations, facility sliding and overturning will need to be developed for specific facilities.

COL Comment 2.5.6-1

The staff's review found that although no impoundment structures lie within the ESP area, the effect of potential flooding of the Mississippi River on the behavior and possible future erosion of the bluff has not been evaluated. The COL applicant should evaluate these effects and their impact on SSI effects.

Confirmatory Comment 2.5.4-1

See COL Comment 2.5.4-1 above.

Confirmatory Comment 2.5.4-2

In RAI 2.5.4-6, the staff requested the applicant to provide the basis for the selection of the EPRI93 curves as opposed to other models that may be more appropriate based on site specific information described in the geotechnical report. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the applicant used the EPRI93 curves to represent the nonlinear properties of the three primary units of the shallow portion of the site profile (loess, alluvium and old alluvium). They selected the EPRI93 curves for deeper depths to account for the more linear behavior of these materials expected due to their overconsolidated state. Below a depth of about 152.4 m (500 ft) of the profile, they considered the soil properties to be linear. With respect to the issue of the appropriateness of using the EPRI93 curves to represent gravel units of the profile, the applicant's response indicates that at the Grand Gulf site the gravels of the profile are relatively fine gravels in a matrix of a sandier matrix. These zones are also indicated to be no more than 1.52 m (5 ft) thick and appear to be discontinuous across the site. The samples viewed by the staff during the site visit corroborated this description. On this basis discussed above, the staff considers that the use of EPRI93 curves (soil model) to represent site soils is consistent with industry practice, and therefore, acceptable. The applicant committed, in their response, that they will update the SSAR to properly indicate which curves of the EPRI93 data set were used for each member of the site profile.

Question 2.5.4-1

In RAI 2.5.4-8, the staff requested the applicant to explain how the values of shear wave velocity developed at the ESP site compare with the best estimate (BE), upper bound (UB) and lower bound (LB) values used in the site response calculations and why the mean velocity values for all the material layers not approximately centered on the ranges listed in ER-02 Table 8.2. From its review of the applicant's response as summarized in Section 2.5.4.1.2 of this report, the staff found that the best estimate S-wave velocity profile used by the applicant in the site response calculations is based on a visually averaged composite of the three P-S velocity profiles. Further, these data are not associated with specific stratigraphic units. Since the modulus degradation and hysteretic damping properties used in the calculations are also not related to stratigraphic units, the staff considers the applicant's response acceptable. However, the applicant should incorporate these responses into the SSAR.

Question 2.5.4-2

Although the geotechnical evaluation of many ordinary facilities encountered issues of budget concerns impacting the numbers of samples taken and samples tested, it is unusual for such reasoning to impact foundation design issues for critical facilities, especially for a program where so few borings and samples were taken as compared to the guidelines provided in RS-002, RG 1.132 and RG 1.138. It is important that the SSAR should indicate if these parameters described above are of serious concern to site response issues associated with the ESP program or are more of concern for detailed foundation design that will be performed during the COL stage.

Additional Question #1

Please provide references about the statement, " the UHS and consequently the SSE are defined to 0.5 Hz (2 second) as the lowest frequency," appeared on the page 2.5-67.

Additional Question #2

In the figure 2.5-59 (revision 1), the median UHS shows a peak value at 25 HZ, however, the response spectra from all the controlling earthquakes are lower than the UHS. What is the possible cause for the bulge on the UHS curve?