MISSISSIPPI POWER & LIGHT COMPANY
Helping Build Mississippi
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NUCLEAR PRODUCTION DEPARTMENT

July 9, 1982

U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: Mr. Harold R. Denton, Director

Dear Mr. Denton:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
License No. CPF-13
File 0272/L-334.0/L-860.0
Soil-Structure Interaction,
OL Condition 2.C (6), SSER 3
Item 1.11 (29)
AECM-82/316

The Mississippi Power & Light (MP&L) letter to the NRC, AECM-82/122, dated April 2, 1982, provided information requested by your staff (Structural Engineering Branch) on the subject of soil-structure interaction. That report provided MP&L's evaluation of the comparison of the elastic half-space and finite element methods of seismic analysis. This issue is reviewed in the Grand Gulf Safety Evaluation Report (SER) and its supplements in subsection 3.7.1 and identified in the Grand Gulf operating license as Condition 2.C (6). This letter provides additional information in support of your review on this subject, as it relates to the design of equipment in the standby service water (SSW) cooling tower and ultimate heat sink (UHS) basin.

The above referenced MP&L report identified the finite element model (FEM) as the method used in the design of equipment in the SSW cooling tower and UHS basin. For comparison purposes, response spectra were generated using the EHS method. The results were presented in Figures 31 and 32 of the subject report. The EHS spectra as shown in these figures were corrected for the embedment effect. MP&L's evaluation of the significance of that comparison is also provided in that report (Part II).

Since the development of information for that report, additional evaluation has been underway to gain insight into the differences in the two methods and to further verify the results obtained thus far. As a result of this review/evaluation process, certain inadequacies were noted in the original analysis employing the FEM approach. This design analysis (for equipment) utilized the SHAKE/LUSH computer code and was an appropriate code selection at the time the design was being finalized. Specifically, these inadequacies pertain to: (1) the selection of size and shape of certain elements representing the soil,

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(2) the soil property definition, and (3) properties used in the plane strain elements to represent the structure. Since in the original analysis only the equipment of the SSW cooling tower and UHS basin were designed using the SHAKE/LUSH codes, the SSW related structures are not affected by these inadequacies.

The review is still in progress. Our preliminary findings indicate that the use of the more current FEM computer code (FLUSH) along with appropriate changes to the input parameters, provides generally lower response spectra than those of the original analysis. With respect to the frequency characteristics of the FLUSH response, a frequency shift of the peak response spectra is observed from 4Hz upward to 6Hz. It is our preliminary conclusion that the differences in the FLUSH/LUSH comparison represent no adverse effect on the subject equipment. Additional information supporting this conclusion is provided as Attachment 1.

Some confirmatory analyses by suppliers of certain components, e.g. SSW and HPCS service water pumps, is anticipated as our review of this issue continues. New response spectra for all effected equipment is being developed using the FLUSH code. A report on the comparison of FLUSH/LUSH FEM codes will be submitted for your review by August 20, 1982.

A status report on our review will be discussed with your staff at the meeting scheduled with SEB on July 16, 1982. Please advise if further information is required.

Yours truly,

L. F. Dale
Manager of Nuclear Services

JGC/JDR:lm
Attachment

cc: Mr. N. L. Stampley (w/o)
Mr. R. B. McGehee (w/o)
Mr. T. B. Conner (w/o)
Mr. G. B. Taylor (w/o

Mr. Richard C. DeYoung, Director (w/a)
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ADDITIONAL INFORMATION REGARDING THE RESPONSE SPECTRA DIFFERENCES RESULTING FROM FLUSH/LUSH COMPARISONS

Pumps: A review of the pump seismic analysis suggests reduced response from most natural modes as a result of potential input adjustment, except for the third mode on the SSW pumps and the third and fourth mode on the HPCS service water pump. Discussions with Dr. C. K. McDonald of the University of Alabama, the pump analyst, indicates that the first mode provides the predominant response. Additional margin in the pump is available by utilizing increased, but more realistic, damping considerations consistent with FSAR commitments. Conservatively low damping values were used in the original analysis. Further, the existing stress analysis report indicates the pumps have additional margin available. Combining all of these factors leads to the conclusion that the potential shift in the response spectra will not affect the pumps' design. Reanalysis is planned to quantify this conclusion.

Piping: The limited effects of localized adverse model response spectra are expected to be eventually offset by reduced response from other modes. This, combined with existing margins in the piping stress and hanger load capacities, suggests that there will be no adverse effect on the piping.

HVAC: Fundamental natural frequencies of the HVAC equipment including supports are above the frequencies affected by the potential change in the response spectra curves.

Fill Beam: Same as HVAC supports.

Control System Equipment: All equipment was designed to a generic response spectra curve which envelopes both the original and potential changes to the response spectra curves.

Electrical Equipment: All equipment was tested to a test response spectra curve which envelopes both the original and potential changes to the response spectra curve.

Cooling Tower Internals:

Fan Blades: The margin between the calculated seismic moment and the static test bending moment is almost an order of magnitude. Therefore, the results of the FLUSH program should not have any impact on the fan blades.

Lintels: The current combined static and seismic loadings give a maximum tensile bending stress that has a significant margin between the calculated stress and the allowable stress. The FLUSH RRS should not have any impact on the lintels.

Extren Beams: The previously calculated combined static and seismic stress is almost negligible. Therefore, no impact to the extren beams will occur.

Fan Motor and Gear Reducer: Natural frequencies are greater than 33 Hz; therefore, no impact will occur.