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SUBJECT: Forwards Rev 0 to "Washington Nuclear Plant 3 Seismic Design Basis Model Validation, Soil Variation Studies," in response to open items in draft safety evaluation re soil/structure interaction/deconvolution issue.

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October 8, 1991
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U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Subject: **NUCLEAR PROJECT NO. 3**
SOIL STRUCTURE INTERACTION/DECONVOLUTION ISSUE
RESPONSE TO OPEN ITEMS IN DRAFT SAFETY EVALUATION

- References: 1) Letter, M.M. Mendonca (NRC), to D.W. Mazur (Supply System), "NRC Review of the Soil-Structure Interaction (SSI) Analysis/Deconvolution Issue for WNP-3", dated February 28, 1991
- 2) Letter, G.C. Sorenson (Supply System) to NRC, "Response to NRC Request for Additional Information on WNP-3 SSI Analysis/Deconvolution Issue", dated August 30, 1989

The NRC Staff stated in the draft safety evaluation attached to reference 1 that the Supply System's methodology using a state-of-the-art analytical technique for resolving the deconvolution issue is acceptable. However, some open items were identified in the draft safety evaluation. Specifically, the Staff observed that the Supply System SSI studies varied the shear modulus of the rock material by only +15% and -15%, whereas Revision 2 of SRP Section 3.7.2 (NUREG-0800) recommends that a very substantial variation in shear modulus be applied. The Supply System has extended the WNP-3 SSI studies to incorporate the revised guidance of SRP Section 3.7.2. The results of these extended studies are provided by the attached supplemental report.

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**SOIL STRUCTURE INTERACTION/DECONVOLUTION ISSUE
RESPONSE TO OPEN ITEMS IN DRAFT SAFETY EVALUATION**

Rock shear modulus parameter variations ranging from -50 to +200 percent of mean, as recommended by the revised SRP, were incorporated into the supplemental WNP-3 SSI models. The results of these extended studies are presented for your review in the form of in-structure spectral comparisons. These comparisons again show that the original WNP-3 seismic design basis spectra retain robust margins of conservatism when compared to the spectral content developed from state-of-the-art SSI analysis techniques (SASSI code application).

Figure 2.9 of the enclosed report presents the only substantive deviation between the design basis and SASSI code generated seismic spectra. The deviation involves a frequency shift in the vertical spectra at the top of the containment vessel. The deviation is bounded in peak magnitude by the design basis spectra (4.0g) and is confined to the 200 percent shear modulus case. By comparison, the SASSI generated horizontal top of containment spectra (Figure 2.4) shows complete boundedness with peak loading magnitudes that are significantly below the design basis spectral envelop peak of 24.0g. Thus, it is deemed that the cited spectral deviation has no significance to design applications since: (1) the location of the spectral deviation is relatively remote in terms of plant subsystems, (2) the observed frequency shift does not represent a gross deviation from the design basis broadened vertical spectra, and (3) the two design basis horizontal seismic loading components will completely dominate the square-root-sum-of-squares development of containment loads (and subsystems in general).

The Reference 1 Safety Evaluation states that a NRC confirmatory audit will be performed following Supply System submittal of extended SSI analyses which encompass a broadened variation of rock foundation material properties. The stated scope of the NRC audit includes review of the detailed WNP-3 SSI model (assumptions and calculations) and review of pertinent empirical geophysical and ground motion data. The Supply System would be pleased to host such an audit. Please advise us as to the specific materials you wish to review and arrangements will be completed as appropriate. Alternatively, if the scope is relatively limited the review materials could be forwarded to the NRC Staff or the offices of your consultants.

This submittal addresses the only remaining open item from the Staff review of the Supply System's soil structure interaction studies. The Supply System has again demonstrated that the original design basis for WNP-3 (finite element analysis) is sufficiently conservative to assure that public health and safety will be protected during and following a design basis earthquake. Significant resources have been expended in the resolution of this issue and personnel knowledgeable of this particular issue are still available. Accordingly, the Supply System asks NRC to evaluate this information and document the findings in a final Safety Evaluation.

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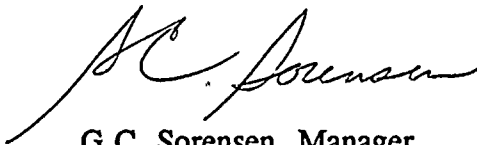
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**SOIL STRUCTURE INTERACTION/DECONVOLUTION ISSUE
RESPONSE TO OPEN ITEMS IN DRAFT SAFETY EVALUATION**

If you have any questions, please contact Mr. D.W. Coleman, WNP-3 Project Licensing Manager at (509) 372-5238.

Sincerely,



G.C. Sorensen, Manager
Regulatory Programs

Attachment: "WNP-3 Seismic Design Basis Model Validation; Soil Variation Studies"

cc: Mr. G. Bagchi, NRC
Mr. A. Lavery, Combustion Engineering
Mr. J.R. Lewis, Bonneville Power Administration (399)
Mr. J.B. Martin, Region V NRC
Mr. M.M. Mendonca, NRC
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