Westinghouse Electric Corporation Energy Systems

Box 355
Pittsburgh Pennsylvania 15230-0355

NSD-NRC-96-4738
DCP/NRC0527
Docket No.: STN-52-003

June 5, 1996

Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

ATTENTION: T. R. QUAY

SUBJECT: STATUS OF DSER OPEN ITEMS IN CHAPTER 2

Dear Mr. Quay:

In a letter dated April 26, 1996 from Diane T. Jackson, NRC to Nicholas J. Liparulo, Westinghouse, a summary of open items related to Chapter 2 of the SSAR for which the NRC staff required additional information was provided. This letter is provided in response to that NRC letter and identify the information required for closure of the items. The attachment to this letter provides the information required for closure and identifies SSAR changes required.

In a telephone call with the staff to discuss and clarify the open items, three of the items were resolved. This closure was based on clarification and discussion of information previously provided to the staff. The items resolved were 2.5.4.6-2, 2.5.4.8-1, and 2.5.4.11-1.

With the submittal of this letter and the transmittal of SSAR Revision 8 including the changes, Westinghouse will have completed providing the information required by the staff to review Chapter 2 of the SSAR.

If you have any questions, please contact Donald A. Lindgren at (412) 374-4856.

Susan V Tanto for

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

/nja

Attachment

cc: D. Jackson, NRC
N. Liparulo, Westinghouse (w/o attachment)

2790A

E004
1/1

ATTACHMENT TO NSD-NRC-96-4738

OPEN ITEMS

Item 2.4.2-1

Westinghouse should justify the selection of plant grade as the maximum flood level, or state that the maximum flood level will be at least 0.3 m (1 ft) below grade.

Response

The first paragraph of Section 2.4 and Table 2-1 will be revised to clarify the difference between grade elevation and maximum flood level. Subsection 2.4.1.1 will be revised to include elevation of areas required for access to the plant.

SSAR Revision:

Revise Paragraph 1 of Section 2.4 as follows:

> The AP600 is designed for a normal groundwater elevation ~~at or below two feet below grade elevation~~ and for a flood level up to plant elevation 100'~~grade~~. For structural analysis ~~design~~ purposes, grade elevation is also established as plant elevation 100 feet. Actual grade will be a few inches lower to prevent surface water from entering doorways.

Revise subsection 2.4.1.1 as follows:

> Combined License applicants referencing the AP600 certified design will describe major hydrologic features on or in the vicinity of the site including critical elevations of the nuclear island and access routes to the plant.

Revise Table 2-1 as follows:

Flood Level	Less than plant elevation 100' ~~finished grade (max)~~
Ground Water Level	Less than plant elevation 100' ~~2 ft below grade (max)~~
Plant Grade Elevation	Less than plant elevation 100' except for portion at a higher elevation adjacent to the annex building

Item 2.5.4-1

Westinghouse should add COL Action Item 2.5.4-1 to the SSAR, requiring that the COL applicant provide site-specific information. (Stability of Subsurface material and foundations.)

Response:

The following table provides guidance to show how DSER open item 2.5.4-1 (Section 2.5.4 of Reg. Guide 1.70) is addressed in the AP600 SSAR. The recommendation to have a Combined License information item to address the stability of subsurface material and foundations is accomplished by a

number of specific Combined License information items that address the subsections of 2.5.4. The table provides a cross reference between the Reg. Guide 1.70 items and the AP600 SSAR information.

R. G. 1.70	Title	AP600 SSAR
2.5.4.1	Geologic Features	2.5.1 & 2.5.4.5.1
2.5.4.2	Properties of Subsurface Material	2.5.4.5.2
2.5.4.3	Exploration	2.5.4.5.2
2.5.4.4	Geophysical Surveys	2.5.4.5.2
2.5.4.5	Excavation and Backfill	2.5.4.5.3
2.5.4.6	Groundwater Conditions	2.5.4.5.4
2.5.4.7	Response of Soil and Rock to Dynamic Loading	2.5.4.5.5
2.5.4.8	Liquefaction Potential	2.5.4.5.6
2.5.4.9	Earthquake Design Basis	2.5.2
2.5.4.10	Static Stability	2.5.4.5.7 & 2.5.4.5.10
2.5.4.11	Design Criteria	2.5.4
2.5.4.12	Techniques to Improve Subsurface Conditions	Note 1
2.5.4.13	Subsurface Instrumentation	2.5.4.5.11
2.5.4.14	Construction Notes	N/A (Note 2)

Notes

1 The implicit and explicit expectation in applicable portions of subsection 2.5.4 is that site characteristics that do not meet the site interface must be corrected or compensation made in the design or analysis. The specification for compensation and corrections measures are site specific and are not addressed as part of the design certification. Foundation improvement measures are a possible compensation measure for subsurface conditions.

2. Construction notes address problems discovered during construction and are not applicable to design certification.

SSAR Revision: NONE

Item 2.5.4.3-2

Westinghouse should consider and document in the SSAR, the effects of differential settlement.

Response:

The effect of settlement is addressed in subsection 2.5.4.3 of the SSAR. Differential settlement

between the nuclear island and surrounding buildings is addressed in paragraph four of the subsection. Differential settlement between the nuclear island and surrounding buildings does not have an adverse effect on safety-related functions. For the main steam lines and the main feedwater lines, anchors located at the exterior walls of the auxiliary building preclude transfer of loads due to differential settlement into the safety related portion of the lines. The flexibility of the lines in the turbine building minimizes the loads due to differential settlement in the nonsafety-related portion of the lines.

SSAR Revision: NONE

Item 2.5.4.4-1

Westinghouse should include in the SSAR, the procedure used in the SSI analyses, as well as the effects of using the dry soil densities for saturated soil conditions.

Response:

Revise the SSAR as shown below

SSAR Revision:

In Subsection 2A.5 revise the final paragraph under **SASSI Foundation Models** as follows:

> For each SSI analysis case, the average strain-compatible soil properties obtained from the free-field analysis of the same case using H1 and H2 time histories are used as input. (See Tables 2A-9 through 2A-12.) The soil densities used in the SSI analyses are the typical densities that are expected from materials under the in-situ conditions. Representative densities were used for the rock and soil materials. The densities are the total weight densities. No correction is made to adjust the densities for cases where the water table is shallow. The change in the total density for saturated soils is expected to be small and the effect on the dynamic soil properties is negligible.

CONFIRMATORY ITEMS

Item 2.5.4.1-1

Westinghouse should document the results of the FF (free field) analyses in the SSAR.

Response:

The deconvolution analyses described in SSAR appendices 2A and 2B calculate the soil motion at each depth that result in the specified free field motion. The theory is described by Schnabel et al in Reference 5 of Appendix 2A. The Free Field motion is deconvolved from the free field and the motion at any depth is only a function of the soil colum above that depth. Thus the analysis for the 240 foot depth also gives the motions at the 120 foot and 40 foot depths corresponding to the free field motion.

SSAR Revision: NONE

Item 2.5.4.5-1

Westinghouse should indicate in the SSAR that the impact of using soil degradation models appropriate for other soil types (such as silts, clays, gravels, and various combinations) on the SSI response of the NI is small.

Response:

Revise the SSAR as shown below

SSAR Revision:

Revise paragraph 1 of subsection 2.5.4.5.5 as follows:

> Response of Soil and Rock to Dynamic Loading - The dynamic characteristics of the soil and rock will be compared against the assumptions made in the standard design regarding the variation of shear wave velocity and material damping will be addressed. The parametric analyses described in Appendices 2A and 2B cover a broad range of dynamic characteristics appropriate for most soil types (sand, silts, clays, gravels, and various combinations).The shear wave velocity (based on low strain best estimate soil properties) must be greater than or equal to 1000 feet per second.