VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

W. L. STEWART
VICE PRESIDENT
NUCLEAR OPERATIONS

November 14, 1984

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. James R. Miller
Operating Reactors Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Serial No. 605
E&C/JFK/jdm:2005N
Docket Nos. 50-338
50-339
License Nos. NPF-4
NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNIT NOS. 1 & 2
SUBMITTAL OF ADDITIONAL INFORMATION
NRC IE BULLETIN 80-11 (MASONRY WALL DESIGN)

This letter provides the additional information regarding NRC IE Bulletin 80-11 (Masonry Wall Design) which was requested by your letter of October 2, 1984. Enclosure I to this letter provides the technical basis and clarification of the fixity condition used in the block wall analysis.

Please contact us if you have any questions or require additional information.

Very truly yours,

W. L. Stewart

Enclosure

cc: Mr. James P. O'Reilly
Regional Administrator
Region II

Mr. M. B. Shymlock
NRC Resident Inspector
North Anna Power Station

IE11
1/1

Original
To: Reg Files

ENCLOSURE I

Item 1

"With respect to the boundary conditions used in the analysis, the Licensee indicated in Reference 1 that fixity was used at the base of a block wall built on a concrete slab. At the perpendicular intersection of two block walls, fixity was also used at those corner joints constructed of alternating courses of the running bond. The licensee is requested to provide the technical basis for assuming fixed-end conditions for these cases. It is believed that without some clamping devices to prevent rotation of the boundary, the assumed boundary conditions may not be valid."

Answers:

In the context of the re-evaluation criteria used in the masonry wall analysis, it would be more appropriate to say that the boundary conditions where the wall might be assumed as fixed were as follows: 1) at the base of the masonry wall where block walls were constructed with a full bed joint, and 2) at the intersection of two block walls where the block walls were constructed with alternating courses of running bond and thus the block and joint interlock tied the walls together. Other types of joints were not considered adequate for the load transfer that would occur with the application of fixed boundary conditions.

The boundary conditions used in the analysis of a particular wall were dependent on the specific wall geometry, the relative stiffness of the adjoining structural elements (slab or wall), and the determination of how the wall would interact with these elements so that the load would be transferred in a manner consistent with the wall geometry specific to the wall being analyzed. In some instances, it was determined that the boundary conditions where fixity might be assumed were not consistent with the specific wall geometry and supporting elements, and in these cases the joints described above were considered as pinned.

The appropriate boundary conditions for each case were selected to be representative of the physical condition for both the calculations of dynamic response and in the distribution of the loads which resulted. The boundary conditions used in the dynamic analysis were consistent with those used in the distribution of loads in each case.

Re-evaluation of masonry block walls utilized conservative assumptions, simplified analysis techniques, conventional boundary conditions, and conservative acceptance criteria. Analysis employed conservative damping values and amplified response spectra. Conventional boundary conditions used were simple, fixed or pinned.

Clamping devices were not used as a means of preventing rotation at fixed boundaries because there was no assurance that such a device would behave as designed to transmit loads without damaging the masonary walls. In lieu of clamping devices and where moment fixity was included as a boundary condition the stresses associated with the resulting boundary moment were transmitted to supporting structures within acceptable stress limits.