VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

February 22, 1978

Mr. Victor Stello, Jr., Director
Division of Operating Reactors
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Serial No. 072/020278
PO&M/DLB:das
Docket Nos. 50-280
50-281
50-338
License Nos. DPR-32
DPR-37
NPF-4

Dear Sir:

This is in response to your letter of February 2, 1978 regarding the possibility that the reactor cavity annulus seal ring or associated biological shielding could become missiles in the event of a loss of coolant accident (LOCA) pipe break inside the reactor vessel cavity. This response provides the information requested for North Anna Power Station Unit No. 1 and for Surry Power Station Unit Nos. 1 and 2.

North Anna Power Station Unit No. 1

The reactor cavity annulus seal arrangement for North Anna Unit No. 1 is shown in Figure 1. The seal consists of a 2 inch thick plate which extends from the cavity edge to the reactor vessel seal ledge. This seal plate is installed only during refueling shutdown conditions. The seal plate is removed during normal operation. There is no biological shielding installed near or above the seal plate area.

Surry Power Station Unit Nos. 1 and 2

The reactor cavity annulus seal arrangement for Surry Unit Nos. 1 and 2 is shown in Figure 2. This seal consists of an inflatable inner cavity seal ring and a reactor cavity annulus cover and seal plate. The annulus cover plate extends from the cavity edge to approximately 6 inches from the reactor vessel seal ledge. The plate has two manways on opposite sides of the reactor. The annulus cover plate is left in place, with manways in place, during normal operation. The inner cavity seal ring is installed only during refueling operations, and is inflated to form a seal between the annulus cover plate and the reactor vessel seal ledge. The inner cavity seal ring is removed and stored during normal operation. Attached to the reactor vessel seal ledge and to the annulus cover plate are drainage troughs to collect any seal leakage. There are two drain lines and one air supply line which extend from the seal area through the cavity wall. The drainage troughs, drain lines and air supply line are left in place during normal operation.

Located below the shield ring and above the reactor vessel nozzles is a supplementary neutron shield as shown on Figure 3. This shield consists of 12 wedge shaped segments of Benelex shielding incased in steel plate and supported by a steel framework which is bolted to the cavity wall.

Upon receipt of your letter of February 2, 1977, we directed our architect-engineer to immediately review the design of these components and to determine their potential for becoming a missile during a loss of coolant accident (LOCA) inside the reactor cavity. A complete review has not been completed at this time. However, preliminary results are as follows.

1) A review of the design indicates that the annulus plate and manway covers will not become dislodged in the event of a LOCA, although plate anchor failure and significant cavity liner deformation is possible.

2) Drainage troughs and piping and the air supply line are unlikely to be dislodged or vented into the upper reactor cavity. The drip pans are constructed of 1/8" stainless steel abundantly bolt-to their support. The drainage troughs will deform significantly under a postulated LOCA event, but are unlikely to become missiles. The possibility of drainage or air piping lines being ejected is remote.

3) The supplementary neutron shielding is supported only for dead weight by its support frame. The individual blocks will therefore be pushed upward by the postulated LOCA event and could be retained by the cover plate. For the shield block to leave the annulus area, the cover plate must have undergone gross deformation, and the shield block must "tumble" such that it can edge its way through the gap between the reactor vessel seal ledge and the cover plate. A detailed study to determine if the extent of deformation will allow the seal blocks to leave the annulus area has not been completed.

Based on these preliminary results we have concluded that continued plant operation would not create undue risk to the health and safety of the public. Justification for continued operation is based on the fact that the event in question, a near instantaneous large rupture of the main coolant pipe inside the reactor cavity, has a very low probability of occurrence. The probability of LOCA initiating ruptures of pipes 6" or larger is estimated by the WASH-1400 study to be in the range of 10^{-5} to 10^{-3} per reactor year. We believe that, considering the large size of the pipes in question (27.5 inches and 29 inches), the lower bound is more appropriate. These factors, combined with the fact that 1) the break of the piping must be large, 2) it must occur inside the reactor vessel cavity, and 3) the break must occur nearly instantaneously, support our conclusion that the probability of a pipe break resulting in reactor cavity pressures sufficient to induce component deformation and possibly missiles from the annulus area is acceptably small such that reactor operation can continue.

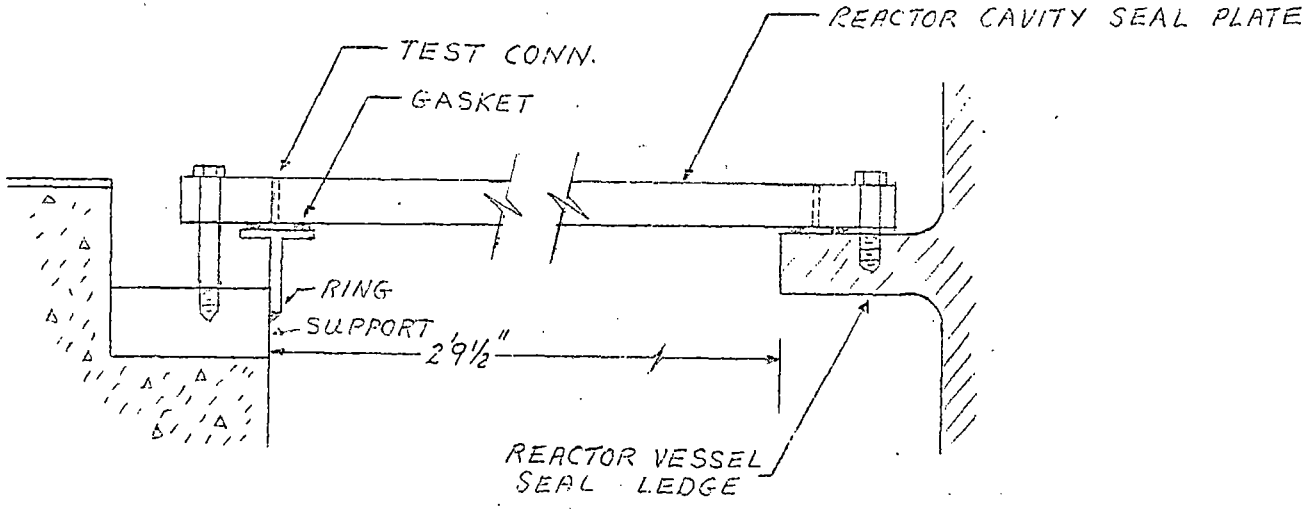
While we believe that continued reactor operation is justified and creates no undue risk to the health and safety of the public we recognize that efforts to resolve this concern should proceed without delay. Accordingly, we have directed our architect-engineer to proceed with their evaluation to determine if corrective action is required.

Corrective action, if required, must be developed in consideration of other actions which may be required in resolving the concern over the design of reactor vessel support systems covered in your letter of January 25, 1978. A schedule for resolution of both of these concerns is currently being developed and should be completed by May 1, 1978. This schedule will be forwarded to you immediately upon completion.

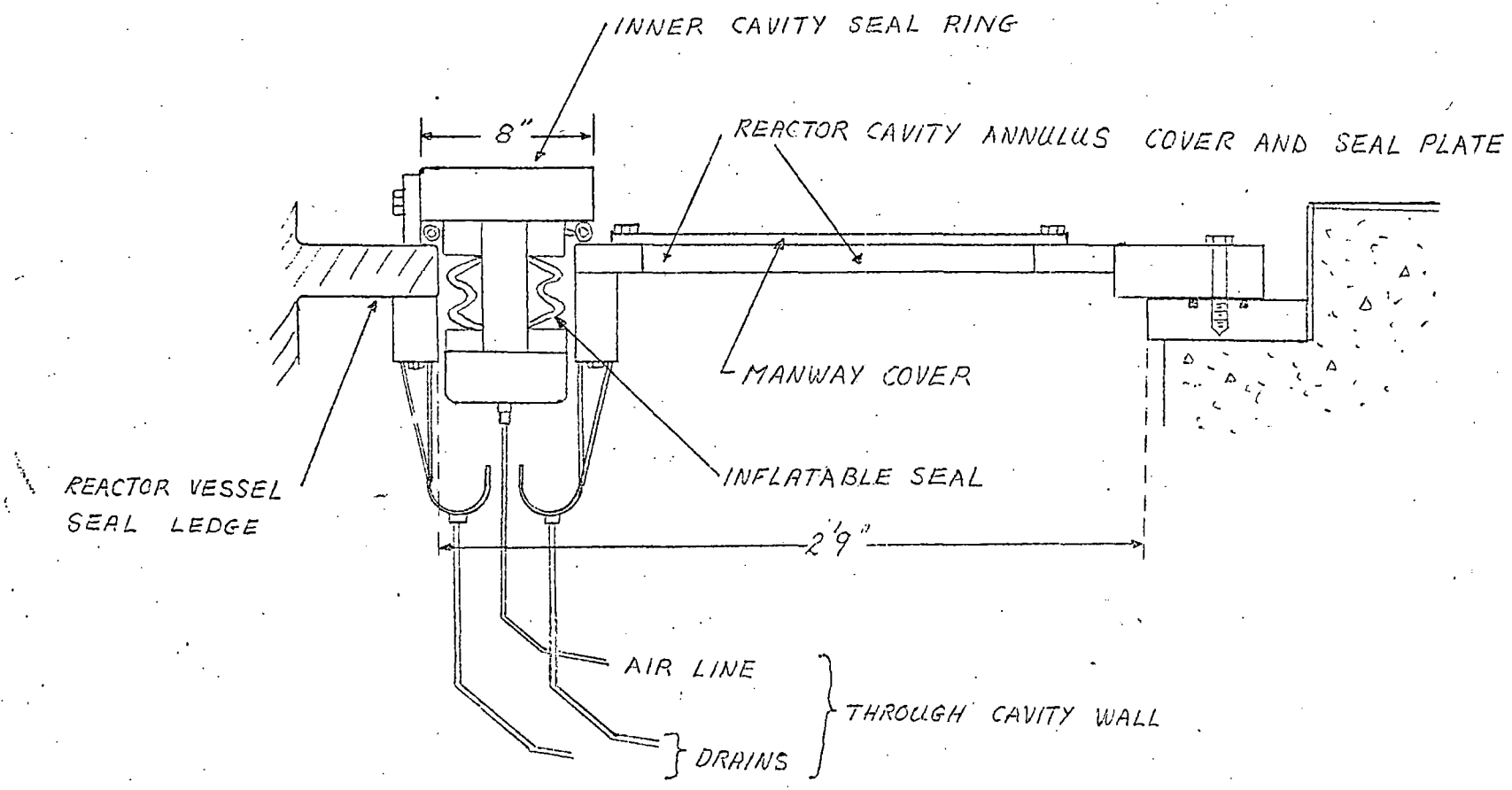
Very truly yours,

C. M. Stallings

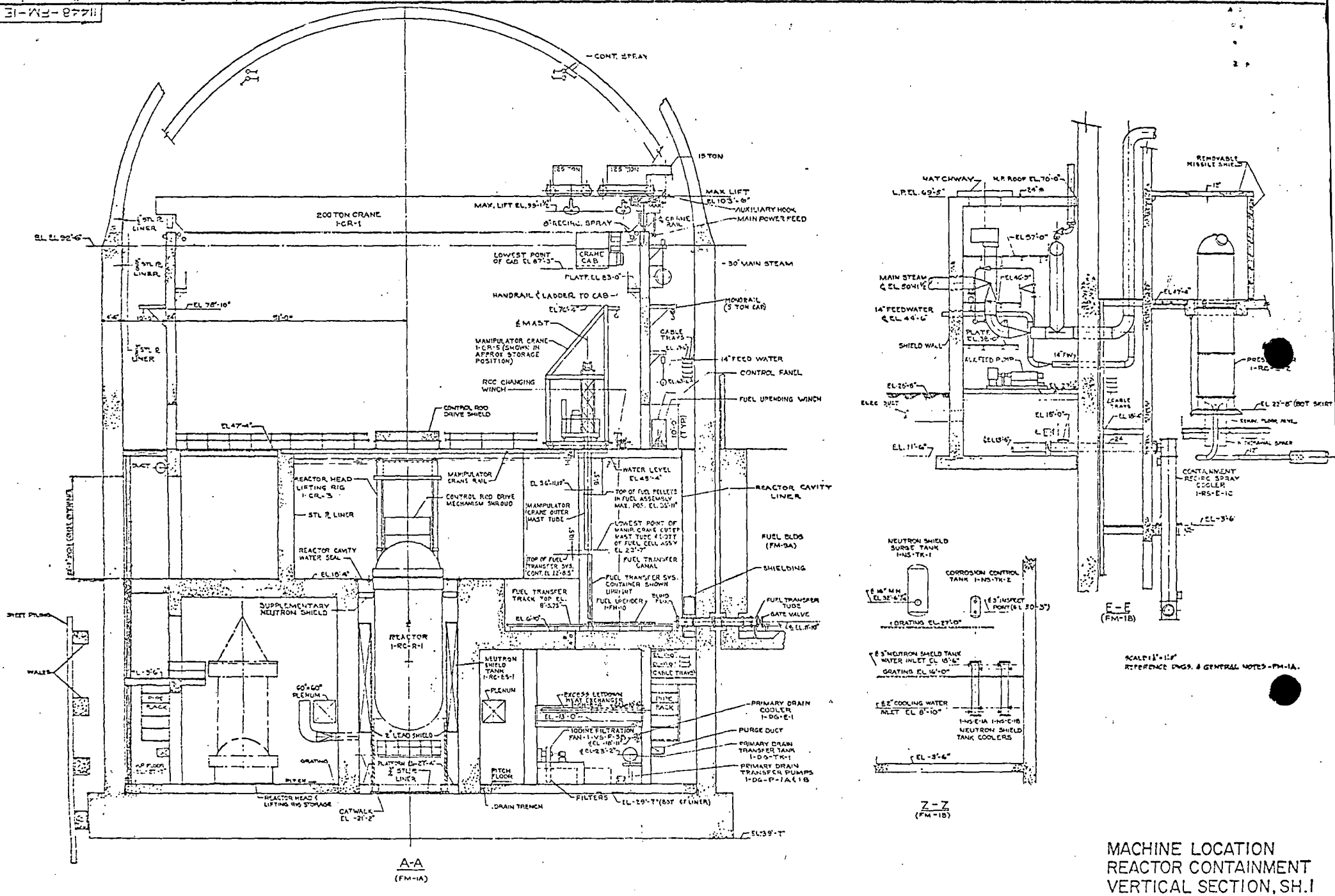
C. M. Stallings
Vice President - Power Supply
and Production Operations



NORTH ANNA - REACTOR CAVITY SEAL



SURRY - REACTOR CAVITY SEAL



SCALE: 1/4" = 1'-0"
REFERENCE DWGS. & GENERAL NOTES - FM-1A.

MACHINE LOCATION REACTOR CONTAINMENT VERTICAL SECTION, SH. 1

SURRY POWER STATION