HUNTON & WILLIAMS
707 EAST MAIN STREET P. O. BOX 1535
RICHMOND, VIRGINIA 23212
TELEPHONE 804 · 788 · 8200

WACHOVIA BANK BUILDING
P. O. BOX 109
RALEIGH, NORTH CAROLINA 27602
919 · 828 · 0311

FIRST VIRGINIA BANK TOWER
101 ST. PAUL'S BOULEVARD
NORFOLK, VIRGINIA 23510
804 · 625 · 5501

1900 M STREET, N. W.
P. O. BOX 19230
WASHINGTON, D.C. 20036
202 · 223 · 8650

FILE NO. V-8-50-20-29-23

DIRECT DIAL NO. 804 788 8368

November 6, 1980

Alan S. Rosenthal, Esq.
Atomic Safety and Licensing Appeal
Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. John H. Buck
Atomic Safety and Licensing Appeal
Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

In the Matter of Virginia Electric and Power Company
(North Anna Nuclear Power Station, Units 1 and 2)
Docket Nos. 50-338 OL and 50-339 OL
Turbine Missiles

Gentlemen:

On the subject of the turbine missile analyses for North Anna 1 and 2, I should like to inform you that the Stone & Webster calculations of P_4, the probability of turbine missile damage, have been completed for Unit 1. These results are summarized in a report called Summary Report on the Turbine Missile Damage Probability Analyses for North Anna Units 1 and 2, a copy of which is enclosed for your information. Since the probabilities are less conservative than the original analysis in the FSAR, Vepco has filed a Licensee Event Report. Under the new Westinghouse analysis for P_1, because the

turbine disk cracking is a time-dependent phenomenon, the probability of missile generation increases with time. Accordingly Vepco is considering a surveillance program to ensure safety for the long term.

You will see, however, that the probability P_4 after two years of continuous operation (17,520 hours) is only 9.528×10^{-7} for low-trajectory missiles and 1.207×10^{-7} for high-trajectory (Table IV), provided one considers perforation but not "scabbing" and makes two other assumptions listed on page 11 under "Criterion B." Stone & Webster advise that scabbing would be greatly attenuated for the structure that creates the greatest part of the risk from low-trajectory missiles (the main steam valve house or MSVH). The piping in the MSVH is typically large-bore, heavy-wall carbon steel, and the valves are designed to fail in a safe position if loss of electrical power or air occurs. Also, the MSVH contains major quantities of large-member structural steel that supports pipe break restraints. Accordingly, serious damage is unlikely to result from scabbing, which produces concrete missiles that typically have only about 10 per cent of the velocity of the original turbine missile. I should add that the probabilities in Table IV do not take credit for most of the conservatisms listed on page 8 of the report.

Stone & Webster have also done a second case that is more conservative still. The results of this "Criterion A" analysis for two operating years is shown in Table III. This

analysis simply assumes that scabbing will occur, and that any scabbing will cause damage, if certain of the structures (including the main steam valve house) are struck by a turbine missile. As a result the calculated probabilities are higher than in Table IV.

Vepco has changed the planned starting date for its next outage for Unit 1 by one month, until January 1, 1981, at which time the unit will have operated 17,740 hours. During the outage, as you know, the Unit 1 turbine will be ultrasonically inspected for disk cracking. The basis on which Vepco justified operation until the outage was given in affidavits provided by Mr. Schmerling of Westinghouse last spring. Because the Westinghouse information on critical crack size and crack growth rate has been revised since then, Westinghouse has updated the tables of crack sizes that were a part of Mr. Schmerling's affidavit. The results, labeled "Rev. 1/5/80," are attached; I ask that you give them the same protection that other Westinghouse proprietary information has received in this proceeding. The ratios of estimated crack depth to critical crack size in these tables are still below 1.0 as of January 1, 1981, and Westinghouse's revised P_1 analysis is consistent with the conclusion that there is reasonable assurance that the Unit 1 turbine can be operated without a rupture of the disk through that date.

Westinghouse has not yet completed the P_1 analysis for North Anna Unit 2 but will do so in due course. You will see probabilities for Unit 2 in the Stone & Webster report, but Stone & Webster calculated these by assuming that the

Unit 2 turbine is identical to the Unit 1 turbine. The analysis for Unit 2 is regarded as a less pressing matter inasmuch as the Unit 2 turbine was ultrasonically inspected before it went into service and had operated only 1,278 hours as of midnight this past November 3.

What I should like to do next is submit to you a more complete package of information, including Westinghouse's P_1 reports, after the Unit 2 analyses are completed. Westinghouse estimates it can finish the Unit 2 P_1 analysis by about December 1, and Stone & Webster will require about two more weeks to complete the P_4 calculations for both Criterion A and B. I will then need a few weeks to assemble or prepare sufficient documents to explain the methodology used, answer questions you have raised in the past, and try to anticipate other questions you may have. I will also report on what long-term measures Vepco plans for dealing with turbine disk cracking.

Yours very truly,

James N. Christman

James N. Christman

126/586

Enclosures
cc: Daniel T. Swanson, Esq.
Anthony J. Gambardella, Esq. (w/o Westinghouse attachments)
Chief, Docketing and Service Section (w/o Westinghouse attachments)