VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

March 16, 2000

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

Serial No.	00-028
NL&OS/ETS	R0
Docket Nos.	50-338
	50-339
License Nos.	NPF-4
	NPF-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
PROPOSED TECHNICAL SPECIFICATION CHANGE
CONTROL ROOM EMERGENCY HABITABILITY
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

In a letter dated May 3, 1999 (Serial No. 99-264),Virginia Electric and Power Company requested amendments, in the form of changes to the Technical Specifications for Facility Operating License Numbers NPF-4 and NPF-7 for North Anna Power Station Units 1 and 2, respectively. The proposed changes support an increase in the allowable leakage from ECCS components, establish a consistent licensing basis for accidents requiring a dose analysis, and clarify the requirements of the control room emergency ventilation system. In a January 7, 2000 letter the NRC staff requested additional information regarding the dose assessment performed to support the Technical Specification changes. The information requested by the staff is provided in Attachment 1.

If you have any further questions, please contact us.

Very truly yours,

D. A. Christian
Vice President – Nuclear Operations

Attachments

Commitments made in this letter:

1. None

A001

cc: U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth Street, SW
Suite 23T85
Atlanta, Georgia 30303

Mr. M. J. Morgan
NRC Senior Resident Inspector
North Anna Power Station

Commissioner
Department of Radiological Health
Room 104A
1500 East Main Street
Richmond, VA 23219

Mr. J. E. Reasor
Old Dominion Electric Cooperative
Innsbrook Corporate Center
4201 Dominion Blvd.
Glen Allen, Virginia 23060

Attachment 1

Response to Request for Additional Information

North Anna Power Station
Units 1 and 2
Virginia Electric and Power Company

Response to Request for Additional Information
North Anna Power Station
Control Room Habitability Amendment Request
TAC Nos. MA 5376 and MA 5377

NRC Introduction

The following information is needed to confirm that the inputs, assumptions, and methodologies used in the North Anna design basis accident dose assessments are appropriate to demonstrate compliance with portions of 10 CFR Part 50 and 10 CFR Part 100. The response to the first question will enable staff to perform a confirmatory calculation of the main steam line break analysis. Questions related to the meteorological data are to ensure that the data are of high quality and representative of long-term overall site conditions. Questions about the inputs and assumptions used are to ensure acceptable merging of engineering-related considerations (e.g., effluent release characteristics) with meteorological characteristics to estimate atmospheric dispersion for each release scenario. The final question addresses confirmation of the most limiting scenario for the steam generator tube rupture analysis.

Question 1: Provide the unaffected steam generator steaming rates for the main steamline break (MSLB).

Response: In the main steamline break accident, the unaffected steam generators are assumed to vent steam through their PORVs for 8 hours. The core decay heat for this accident would be the same as the core decay heat for the steam generator tube rupture accident. Therefore, the average mass flows out of the unaffected PORVs for the main steamline break would be expected to be the same as the average mass flows out of the unaffected PORVs during the steam generator tube rupture accident. Furthermore, since the steaming rates for the unaffected steam generators are nearly identical, they are treated as identical for application of Chi/Q and dose consequence modeling. For the steam generator tube rupture accident the steam flows for LOOP and non-LOOP conditions for the first 30 minutes are included in Table 1 (next page).

Question 2: Were all data used in the analysis collected under Regulatory Guide 1.23, "Onsite Measurement Programs," guidelines? If not, how were the data collected that did not meet the recommendations of Regulatory Guide 1.23 and why are the collection methodologies/conditions acceptable?

Response: All data were collected using the guidelines under Regulatory Guide 1.23, "Onsite Measurement Programs."

Question 3: During the period of data collection, was the tower area free of obstructions (e.g., structures, trees) and micro scale influences to ensure that the data collected were representative of the overall site area?

Response: Yes, the tower area was free of obstructions and micro scale influences during the period of data collection.

Table 1

Steam Flows Through the PORVs For LOOP And Non-LOOP Conditions During A Steam Generator Tube Rupture Accident For the First 30 Minutes

PORV flow - unaffected steam generator -**LOOP**		PORV flow – unaffected steam generators-**NO LOOP**	
Time (sec)	PORV flow (lbm/sec)	Time (sec)	PORV flow (lbm/sec)
0 - 102	0.0	0 - 106	0.0
103	6.9	107	37.5
104	65.2	108	97.9
105	118.8	109	1216
107	123.4	110	124.4
109	127	111	126.9
113	128.7	114	129.1
120	127.6	120	128.3
150	125.4	150	126.7
200	116.9	200	124.8
225	84.4	250	123.6
250	78.6	300	120
275	74.2	500	118.3
300	59.1	700	117.5
500	37.6	820	114.8
700	38	860	62.4
900	36.9	900	42.1
1100	36.5	1100	41
1300	36.2	1300	41.3
1500	35.9	1500	41.4
1700	35.6	1700	41.4
1800	34.6	1800	41.4

Over the next 7.5 hours the unaffected steam generators combined release is 1,141,000 lbm of steam for no LOOP conditions and 892,000 lbm of steam for LOOP conditions.

Questions 4: What quality assurance checks were performed on the meteorological measurement systems prior to, and during the period of collection to assure that the data are of high quality? What additional checks were performed on the data following collection and prior to input into the atmospheric dispersion calculations?

Response: The data from the meteorological monitoring sites at North Anna Power Station are telemetered every day to our corporate offices at Innsbrook Technical Center in Glen Allen, VA. Each business day, the data from the previous calendar day or days are reviewed by Environmental Policy and Compliance (EP&C) personnel. The data from each tower level and from each site at North Anna are compared for consistency. In addition, comparisons are made with data collected at other Virginia Power meteorological monitoring sites in Fluvanna County, Prince William County, and Chesterfield County, as well as with data from National Weather Service offices in Washington, DC and Richmond, VA. If questions arise regarding the validity of any of the data, professional meteorologists from the EP&C staff are called on to review the data. The data are edited as applicable during the month. At the end of each month, the data are merged into a historical database located on the corporate mainframe computer. A program is run which performs more detailed seasonally adjusted statistical checks of the data and flags any hour of data in which a potential outlier occurs. If necessary, review of the data by staff meteorologists is done and any further editing is performed. A monthly statistical summary of the data is run to insure its overall consistency and representativeness.

Question 5: Page 13 of 37 states that the meteorological data used in the analyses are from 1989 through 1993, inclusively. Provide a copy of the meteorological data used to calculate the X/Q values. Data should be provided in the format specified in Appendix A to Section 2.7, "Meteorology and Air Quality," of draft NUREG-1555, "Environmental Standard Review Plan." A copy of this format is attached. Otherwise, provide the data electronically in the format used to input it into the ARCON96 computer calculations.

Response: The meteorological data for 1989-1993 is attached electronically in a zipped format named "napsmet.zip." This data is in the input format for ARCON96.

Question 6: Provide a list of each of the other inputs to the ACRON96 calculations. Describe the assumptions and bases for selection of the input values so as to result in the limiting dose.

Response: Input To ARCON96 for Worst Case Unaffected PORVs are as follows:

Elevation of lower wind instrument – 10 meters
Elevation of upper wind instrument – 48.4 meters

Source – unaffected PORV – Steam Generator B
Type of release – VENT
Elevation of Source – 20.7 meters
Receptor – normal control room intake
Distance from source to receptor – 17.8 meters
Elevation of intake – 7.1 meters
Building area – 1500 square meters (containment building)
Vertical velocity of source – 10 meters per second
Volumetric flow of source – 0.51 cubic meters per second
Vent stack radius – 0.13 meters

Source – unaffected PORV – Steam Generator A
Type of release – VENT
Elevation of Source – 20.7 meters
Receptor – turbine building fresh air louver at frame line 3
Distance from source to receptor – 45.9 meters
Elevation of receptor – 17.7 meters
Building area – 1500 square meters (containment building)
Vertical velocity of source – 10 meters per second
Volumetric flow of source – 0.51 cubic meters per second
Vent stack radius – 0.13 meters

None of the entries on the ARCON96 default values form was changed.

Sensitivity runs were made with ARCON96 to determine the impact of vent release vertical velocities on the resulting atmospheric dispersion factors. The sensitivity runs showed that higher vertical velocities generally resulted in lower atmospheric dispersion factors. This result was attributed to the mathematical treatment of vent releases by ARCON96. That is, the higher the vertical velocity of the vent release, the more of the release was modeled as an elevated release and the less was modeled as a ground level release.

Because of the results of the sensitivity runs, extremely low vertical velocities were assumed as input into ARCON96 to ensure that the resulting atmospheric dispersion factors were conservative. This was done by modeling the unaffected PORVs as being open continuously for 8 hours. In reality, the PORVs would be expected to cycle open and closed for the 8 hours which would result in high vertical velocities during those times when the PORVs were open. The SGTR with LOOP produced lower average flow rates than the SGTR with no LOOP. Therefore, the average flow rates for the SGTR with LOOP were used. Also, the steam exiting the PORVs was assumed to be at a very high density to further minimize the vertical velocities. The steam would be at a density approaching 0.032 lbm/cubic foot at the top of the PORV exhaust stack. To lower the vertical velocity, a density of 1 lbm/cubic foot was assumed. Finally, there was no height adjustment of the release elevation for jet rise. That is, the release height was modeled as the elevation of the PORV stack without any adjustments.

Question 7: Page 21 of 37 notes that the affected steam generator X/Q values are smaller than the values for the unaffected generators because of the higher discharge velocity. Provide a further description of the assumptions, bases, and calculations to determine that the higher discharge velocity from the affected steam generators would result in a lower X/Q and dose than for the unaffected steam generator. While we agree that jet rise can be a factor, please address the impact of a release without loss of offsite power such that releases are from the secondary plant (e.g., air ejector). What degree of assurance is there that the affected steam generator release location will maintain high vertical velocity over time? What assumptions are made and what are the bases of the assumptions with respect to wind and structural effects on the vertical velocity.

Response: Sensitivity runs were made with ARCON96 to determine the impact of vent release vertical velocities on the resulting atmospheric dispersion factors. The sensitivity runs showed that higher vertical velocities generally resulted in lower atmospheric dispersion factors. This result was attributed to the mathematical treatment of vent releases by ARCON96. That is, the higher the vertical velocity of the vent release, the more of the release was modeled as an elevated release and the less was modeled as a ground level release.

An analysis was done for Surry Power Station to determine the radiological impact of air ejector flow during a steam generator tube rupture under both non-LOOP and LOOP conditions. Because of the conservatisms in the original Surry SGTR calculations, the doses from the air ejector analysis were less than or equal to doses in the original SGTR calculations. Due the similarities between Surry and North Anna in construction and the similarities between the Surry and North Anna dose calculations, it is expected that the radiological impact of air ejector flow at North Anna would also be insignificant. However, no explicit North Anna radiological analysis of air ejector flow has been done.

With respect to vertical release velocity over time, please refer to the responses to Question 6. The vertical velocities input into ARCON96 were based on the implicit assumption that the wind was not blowing straight down and thereby reducing the vertical velocity component of the PORV exhaust flow. The PORVs exhaust through a vertical pipe 10" in diameter. These vertical pipes have no caps and effluent exhausting through them would go straight up. There are no structures interfering with the PORV exhaust flow.