

VIRGINIA ELECTRIC AND POWER COMPANY  
RICHMOND, VIRGINIA 23261

September 10, 1996

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D.C. 20555-0001

Serial No. 96-466  
NAPS/JHL R2  
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**  
**GENERAL DESIGN CRITERIA 17: REVISED COMMITMENT**  
**RELATED TO RESPONSE TO OVERVOLTAGE CONDITIONS**

Virginia Electric and Power Company letter dated June 4, 1982 (Serial No. 316), responded to NRC questions concerning General Design Criteria 17. The response to Question 5 identified overvoltage setpoints for the 4160 and 480 volt buses. The response also indicated that relays were installed to provide overvoltage monitoring for each protective train. Upon receipt of an overvoltage alarm, manual action would be taken within 15 minutes to alleviate the overvoltage condition. As a result of our response, the NRC documented in the Updated Safety Evaluation on the Adequacy of Station Electric Distribution Voltages, dated November 13, 1984, that operator actions would be taken in the event of an overvoltage condition.

This letter is to inform you that we are revising our commitment to take operator action within 15 minutes of an overvoltage condition. Operators will now be required to respond to an overvoltage condition within two hours. It should be noted that there is not a technical basis for the existing time duration for responding to an overvoltage condition. However, the basis for the commitment revision is provided below.

Due to demands placed upon it during worst case postulated conditions, the electrical distribution system is operated at voltages high enough to sometimes initiate overvoltage alarms. Emergency bus voltage is maintained by the Reserve Station Service Transformer automatic load tap changers. These tap changers are capable of maintaining voltage within the controller setpoint band over the full range of switchyard voltages. However, there is some unavoidable overlap between the controlled voltage ranges and the overvoltage relay setpoint ranges, particularly on lightly loaded 480 volt busses. As a result, overvoltage alarms occur with some regularity, several times daily during refueling outages and as often as once per day during normal operations. The actual overvoltage present in these cases has been determined to be negligible. The

1/0  
A001

present requirement to take remote-manual action within 15 minutes places an unnecessary burden on operations personnel. The response time is being extended to be commensurate with the condition's significance and potential risk and to enhance the ability of operations personnel to effectively manage its activities while ensuring the safe operation of the plant.

IEEE Std. 666-1991 in part states, "In generating station applications, it is considered acceptable to exceed equipment voltage tolerance during some short term plant operating conditions. This is primarily due to the high level of instrumentation found in generating stations that permits close monitoring of auxiliary equipment. If the steady-state system voltage regulation must be increased, it may be more desirable to skew the system voltage toward overvoltage rather than undervoltage. This is because overvoltage will normally occur during light load conditions of the generating station, which should be of shorter duration and less frequent than normal load conditions."

The components of the electrical distribution system itself are generally not of concern. Switchgear, circuit breakers, cables and other equipment for the 480 volt and 4160 volt systems are typically rated for 600 volts and 5000 volts, respectively. The only 120 volt AC safety related power supplies are the vital buses which are supplied from regulated inverters.

The primary concern for overvoltage is induction motors. IEEE Std. 666-1991 states, "In general, voltages slightly above nameplate ratings have a less detrimental effect on (induction) motor performance than voltages slightly below nameplate ratings. However, voltages higher than 110% of rated voltage may saturate the stator iron, thereby increasing the fundamental and harmonic components of exciting current and losses by many times. This increased excitation loss will result in higher motor temperature. Greater than normal voltage regulation may be acceptable under reduced load or lower ambient conditions."

The EPRI Power Plant Reference Series indicates that motor winding temperature increases are low for overvoltages as high as 115% of nominal for newer, more strongly magnetized motor designs. For older motor designs, the information indicates that motor temperatures continue to decrease for overvoltages in excess of 110% of nominal. Most of the motors at North Anna can be categorized as older motor designs. It is assumed that some motors would experience increased temperatures as a result of application of greater than 110% of nominal voltage.

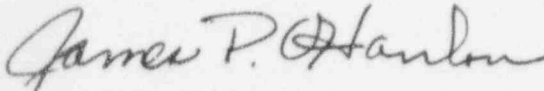
Extending the specific response time for an overvoltage alarm may result in longer alarm duration and, therefore, higher temperatures for some motors. This is acceptable because the degree of expected overvoltage is small, motors are not operating at full capacity (motors are normally purchased with a 1.15 service factor but are operated below 1.0), and ambient temperature at the motor location is normally maintained below the motor's maximum temperature rating. Therefore, the higher motor temperature will not exceed the maximum rated temperature for the insulation system. Also, this will not significantly increase the heating loads, for ventilation / air conditioning systems, impacting plant areas or other plant equipment.

Based on the above discussion, we find it acceptable to extend the response time for taking operator action to two hours to alleviate an overvoltage condition. The impact of a slight overvoltage condition has been determined not to be significant and the two hour time frame allows action to be taken based on operational priorities.

This letter modifies our existing commitment for operator action in response to an overvoltage from fifteen minutes to two hours. No additional commitments are being made or revised by this letter.

If you have any questions, please contact us.

Very truly yours,

A handwritten signature in cursive script, reading "James P. O'Hanlon".

James P. O'Hanlon  
Senior Vice President - Nuclear

cc: Regional Administrator  
U.S. Nuclear Regulatory Commission  
Region II  
101 Marietta Street, N.W.  
Suite 2900  
Atlanta, Georgia 30323

Mr. R. D. McWhorter  
NRC Senior Resident Inspector  
North Anna Power Station