VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

July 24, 1981

R. H. LEASBURG
VICE PRESIDENT
NUCLEAR OPERATIONS

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Robert A. Clark, Chief
Operating Reactors Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Serial No. 908A
PSE&C/EVF/KSB
Docket Nos. 50-338
50-339

License Nos. NPF-4
NPF-7

Dear Mr. Denton:

GENERATOR BREAKER ADDITION AND
GENERAL DESIGN CRITERIA 17 ANALYSIS
NORTH ANNA UNIT NOS. 1 AND 2

In our letter to you dated September 24, 1980, Serial No. 725A, we discussed the installation of generator breakers for North Anna Units 1 and 2. We have installed a generator breaker on Unit 1 and are presently analyzing the adequacy of this single installed breaker in providing a permanent solution to the General Design Criteria 17 (GDC-17) concern at North Anna. A one line diagram showing the present situation at North Anna is attached.

With this breaker in service, Unit 1 start-ups will be accomplished with the Normal Station Service buses being fed from the Normal Station Service transformers (back-fed from the 500 kv switchyard) rather than from the Reserve Station Service transformers. For the majority of Unit 1 trips, Unit 1 will continue to have its Normal Station Service buses fed from its Normal Station Service transformers. This arrangement reduces the probability of combined loading from both Unit 1 and 2 normal and emergency buses on the Reserve Station Service transformers.

Our analyses to determine the adequacy of the installed generator breaker are being conducted in reference to our interpretation of item 2 of the "Guidelines for Voltage Drop Calculations" which was attached to the NRC letter dated August 8, 1979, entitled "Adequacy of Station Electrical Distribution System Voltages." Our interpretation is based on a May 20, 1981 telephone conference with your Mr. L. G. Engle and is as follows:

In the analyses of voltage conditions available from the Reserve Station Service System, we are assuming that the worst case would be for Unit 2 to have all of its loads on the reserve, while Unit 1 has its SI activated safety loads and intake structure loads only on the reserve. We are able

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to make this assumption on the basis that Unit 1 now has a generator breaker which provides the capability of tripping the unit without transferring loads to the reserve system. We feel that the "accident" or the "anticipated transient in the unit being analyzed" discussed in item 2 of the reference, does not include the occurrences that would cause Unit 1 to transfer loads to reserve at the same time that Unit 2 is fully loaded from the reserves.

The scope of our ongoing analyses includes all guidelines and requirements set forth in the August 8, 1979 letter previously mentioned, and those mentioned in the June 25, 1980 letter that included a "Request for Additional Information Regarding the Adequacy of Station Electric Distribution System Voltages". Also included in the analyses will be those points which were discussed in an April 2, 1981, telephone conference with your Mr. L. G. Engle and Mr. A. Udy of EG&G. These analyses will be completed and results forwarded to you within six months.

We are presently assembling technical information concerning the generator breaker installed on Unit 1. This information will cover mechanical, electrical and operating characteristics of the breaker and will be forwarded for your review within 60 days.

The installation of the generator breaker on Unit 1 creates an additional independent source of offsite power from the transmission network to the onsite power distribution system, analogous to the Reserve Station Service system, which is not dependent on the mode of operation of the Unit 1 generator. In addition, the Unit 2 Normal Station Service system can be considered an additional independent source of offsite power from the transmission network to the onsite power distribution system. This source, however, is dependent on the mode of operation on the Unit 2 generator.

To establish two independent offsite power sources to each emergency bus, normal to emergency bus ties will be utilized on each unit. Presently, the Unit 1 ties have been installed and are in service. These ties consist of Bus 1B to Bus 1H and Bus 2B to Bus 1J ties. It is our intention to install the Unit 2 ties during the next scheduled Unit 2 refueling outage (Spring 1982). The Unit 2 ties will consist of Bus 2C to Bus 2H and Bus 1A to Bus 2J ties. All of the normal to emergency bus ties have a normally open breaker at each bus. In conjunction with this modification, the administrative ties between buses 1H and 1J have been removed. The administrative ties between buses 2H and 2J will be removed during installation of the Unit 2 normal to emergency bus ties. The bus ties will operate as follows:

On either degraded voltage or loss of voltage, an emergency bus will transfer from its normally connected Reserve Station Service transformer to the assigned Normal Station Service bus, provided that bus is available (voltage present) and electrically acceptable (no faults, etc.). This

transfer will be initiated and completed during the interval between the deisel generator start signal (degraded voltage, loss of voltage) and its designed closing time to the emergency bus. If this transfer is not completed in this interval, the transfer will be aborted and the diesel generator will load to the emergency bus as designed.

A preliminary copy of our proposed changes to the Technical Specifications for Unit 1 is attached for your review. While these changes are not required, their implementation would more accurately reflect the installed system.

Please advise if further information is required.

Very truly yours,

R. H. Leasburg
Vice President - Nuclear Operations

Attachments

cc: Mr. J. P. O'Reilly, Director
Office of Inspection and Enforcement
Region II
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

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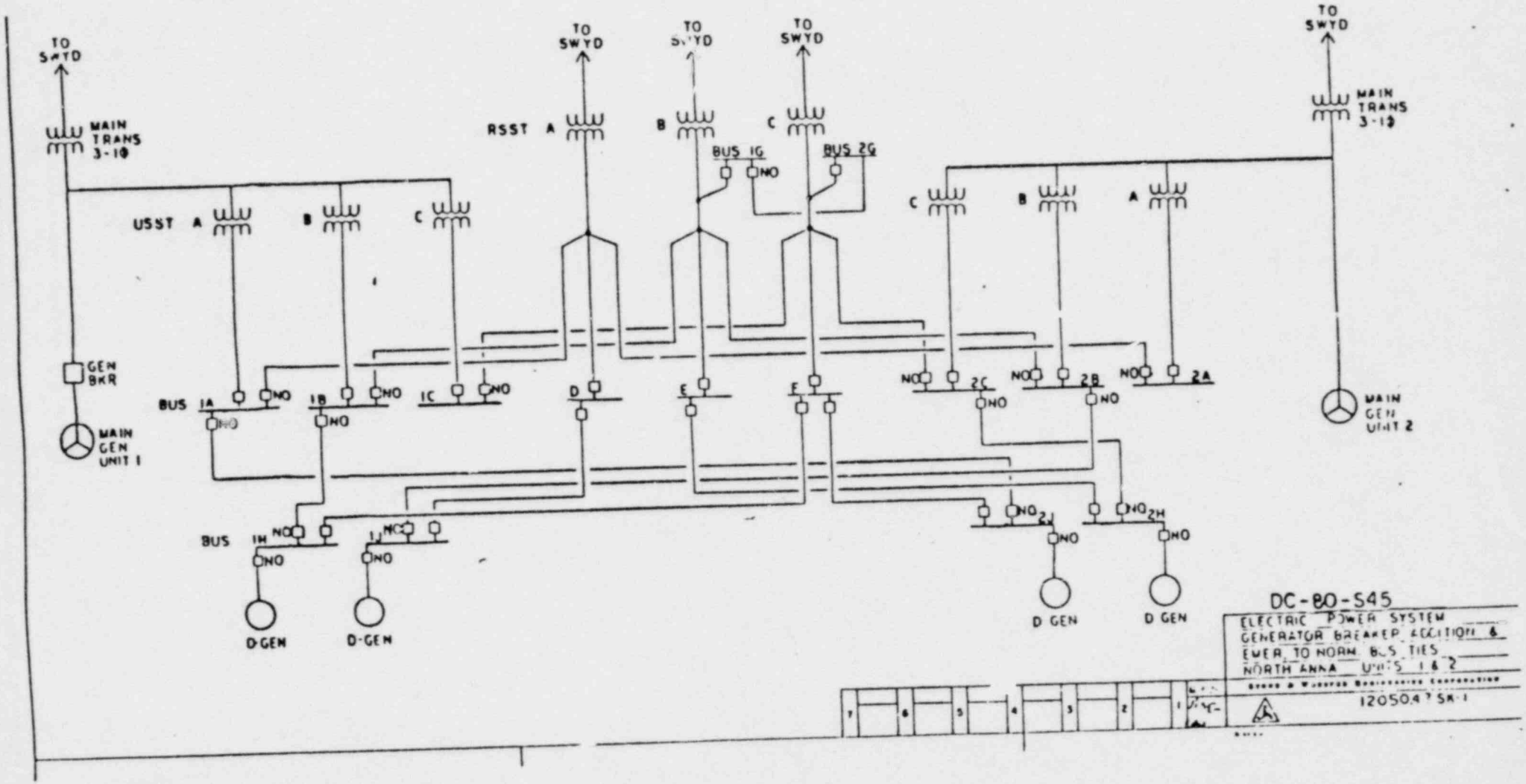

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ELECTRIC POWER SYSTEM
GENERATOR BREAKER SECTION &
EMER TO NORM BUS TIES
NORTH ANNA UNITS 1 & 2

Stone & Webster Engineering Corporation

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3/4.8 ELECTRICAL POWER SYSTEMS

3/4.8.1 A.C. SOURCES

OPERATING

LIMITING CONDITION FOR OPERATION

3.8.1.1 As a minimum, the following A.C. electrical power sources shall be OPERABLE:

~~a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system, and~~

SEE ATTACHED PAGE

b. Two separate and independent diesel generators:

1. Each with a separate day tank containing a minimum of 750 gallons of fuel, and

2. A fuel storage system containing a minimum of 45,000 gallons of fuel, and

3. A separate fuel transfer pump.

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION: for each emergency bus

a. With either an offsite circuit or diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter; restore at least ~~two~~ one offsite circuits and ~~two~~ one diesel generators to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one offsite circuit and one diesel generator of the above required A.C. electrical power sources inoperable, demonstrate the OPERABILITY of the remaining A.C. sources by performing Surveillance Requirements 4.8.1.1.1.a and 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter; restore at least one of the inoperable sources to OPERABLE status within 12 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours; restore at least ~~two~~ one offsite circuits and ~~two~~ one diesel generators to OPERABLE status within 72 hours from the time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

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3.8.1.1 a. At least two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system with a minimum of one circuit feeding 4kv Emergency Bus 1H and one circuit feeding 4kv Emergency Bus 1J, and

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ELECTRICAL POWER SYSTEMS

ACTION (Continued):

c. With the two ~~of the~~ above required offsite A.C. circuits inoperable, demonstrate the OPERABILITY of two diesel generators by performing Surveillance Requirement 4.8.1.1.2.a.4 within one hour and at least once per 8 hours thereafter, unless the diesel generators are already operating; restore at least one of the inoperable offsite sources to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours. With only one offsite source restored, restore at least ~~two~~ one offsite circuits to OPERABLE status within 72 hours from time of initial loss or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. for one emergency bus

d. With two of the above required diesel generators inoperable, demonstrate the OPERABILITY of ~~two~~ one offsite A.C. circuits by performing Surveillance Requirement 4.8.1.1.1.a within one hour and at least once per 8 hours thereafter; restore at least one of the inoperable diesel generators to OPERABLE status within 2 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Restore at least two diesel generators to OPERABLE status within 72 hours from time of initial loss or be in least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. for each emergency bus

SURVEILLANCE REQUIREMENTS

4.8.1.1.1 Each of the above required physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system shall be:

a. Determined OPERABLE at least once per 7 days by verifying correct breaker alignment indicating power availability.

4.8.1.1.2 Each diesel generator shall be demonstrated OPERABLE:

a. At least once per 31 days on a STAGGERED TEST BASIS by:

1. Verifying the fuel level in the day tank.

2. Verifying the fuel level in the fuel storage tank.

SURVEILLANCE REQUIREMENTS (Continued)

3. Verifying the fuel transfer pump can be started and transfers fuel from the storage system to the day tank.

4. Verifying the diesel starts from ambient condition and accelerates to at least 900 rpm in ≤ 10 seconds.

5. Verifying the generator is synchronized, loaded to ≥ 1375 kw, and operates for ≥ 60 minutes, and

6. Verifying the diesel generator is aligned to provide standby power to the associated emergency busses.

b. At least once per 92 days by verifying that a sample of diesel fuel from the fuel storage tank is within the acceptable limits specified in Table 1 of ASTM D975-74 when checked for viscosity, water and sediment.

c. At least once per 18 months during shutdown by:

1. Subjecting the diesel to an inspection in accordance with procedures prepared in conjunction with its manufacturer's recommendations for this class of standby service,

2. Verifying the generator capability to reject a load of ≥ 610 kw without tripping,

3. ~~Simulating a loss of offsite power in conjunction with a safety injection test signal, and:~~

SEE ATTACHED PAGE

~~a) Verifying de-energization of the emergency busses and load shedding from the emergency busses.~~

b) Verifying the diesel starts from ambient condition on the auto-start signal, energizes the emergency busses with permanently connected loads, energizes the auto-connected emergency loads through the timers and operates for ≥ 5 minutes while its generator is loaded with the emergency loads.

4.8.1.1.2c

3. Simulating a loss of the reserve station service system in conjunction with a safety injection test signal to be followed by simulating the loss of the normal station service system, and:

   a) Verifying the sequence of emergency busses separating from the reserve station service system, connecting to the normal station service system, separating from the normal station service system, and load shedding from emergency busses.

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ELECTRICAL POWER SYSTEMS

3/4.8.2 ONSITE POWER DISTRIBUTION SYSTEMS

A.C. DISTRIBUTION - OPERATING

LIMITING CONDITION FOR OPERATION

3.8.2.1 The following A.C. electrical busses shall be OPERABLE and energized with all existing tie breakers open between redundant busses:

4160	volt Emergency Bus # 1H
4160	volt Emergency Bus # 1J
480	volt Emergency Bus # 1H, 1H1
480	volt Emergency Bus # 1J, 1J1
120	volt A.C. Vital Bus # 1-I
120	volt A.C. Vital Bus # 1-II
120	volt A.C. Vital Bus # 1-III
120	volt A.C. Vital Bus # 1-IV

APPLICABILITY: MODES 1, 2, 3 and 4.

ACTION:

With less than the above complement of A.C. busses OPERABLE, restore the inoperable bus to OPERABLE status within 8 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.8.2.1 The specified A.C. busses shall be determined OPERABLE with tie breakers open between redundant busses at least once per 7 days by verifying correct breaker alignment and indicated power availability. where applicable

3/4.8 ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1 and 3/4.8.2 A.C. and D.C. POWER SOURCES AND DISTRIBUTION

The OPERABILITY of the A.C. and D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

SEE ATTACHED PAGE

The ACTION requirements specified for the levels of degradation of the power sources provide restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least one of each of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the facility status.

3/4.8 ELECTRICAL POWER SYSTEMS

BASES

3/4.8.1 and 3/4.8.2 A.C. and D.C. POWER SOURCES AND DISTRIBUTION

The OPERABILITY of the A.C. and D.C. power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant A.C. and D.C. power sources and distribution systems satisfy the requirements of General Design Criteria 17 of Appendix "A" to 10 CFR 50.

With a generator breaker installed on Unit 1 and normally open ties between buses 1H and 1B and between buses 1J and 2B, each 4 kv emergency bus will have two physically independent feeders from the offsite transmission network. The two offsite feeders to emergency bus 1H will be physically independent from the two offsite feeders to emergency bus 1J. Each emergency-to-normal bus tie will have a normally open breaker at each bus.

The ACTION requirements specified for the levels of degradation of the power sources provided restriction upon continued facility operation commensurate with the level of degradation. The OPERABILITY of the power sources are consistent with the initial condition assumptions of the accident analyses and are based upon maintaining at least one of each of the onsite A.C. and D.C. power sources and associated distribution systems OPERABLE during accident conditions coincident with an assumed loss of offsite power and single failure of the other onsite A.C. source.

The OPERABILITY of the minimum specified A.C. and D.C. power sources and associated distribution systems during shutdown and refueling ensures that 1) the facility can be maintained in the shutdown or refueling condition for extended time periods and 2) sufficient instrumentation and control capability is available for monitoring and maintaining the facility status.