October 8, 1979

FILE: NG-3514(B) SERIAL NO.: GD-79-2519

Office of Nuclear Reactor Regulation
Attention: Mr. T. A. Ippolito, Chief
Operating Reactors Branch No. 3
United States Nuclear Regulatory Commission
Washington, D. C. 20555

BRUNSWICK STEAM ELECTRIC PLANT, UNIT NOS. 1 AND 2
LICENSE NOS. DPR-71 AND DPR-62
DOCKET NOS. 50-325 AND 50-324
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION: DEGRADED GRID VOLTAGE

Dear Mr. Ippolito:

After reviewing the NRC requests of August 8, 1979, and August 16, 1979, and the telephone conversation of September 11, 1979 between Mr. Matthew Thirmal (NRC) and our staff for clarification, information is provided on the following requests:

I. Provide an analytical study of the plant electrical auxiliary system where all the normal running loads are being powered from the auxiliary transformer and a shift to the startup transformer is initiated simultaneous with the activation and subsequent starting of all the safety systems required for an accident.

II. Provide a test outline and results for verifying the adequacy of the Plant Electrical Auxiliary System as defined in Section I above.

III. Review the electric power systems to determine if there are any events or conditions which could result in the simultaneous or consequential loss of both required circuits to the offsite network to determine if any potential exists for violation of GDC-17 in this regard.

REQUEST RESPONSES

I. ANALYTICAL REPORT

Attached (Enclosure 1) are the results of the Voltage Drop Study which analyzes the voltage regulation performance of Brunswick Unit No. 2 under various operating conditions. While other sequences of events could be postulated to degrade the plant electrical auxiliaries, the worst case conditions have been addressed in this study. Minimum switchyard voltage requirements have been identified for these

A015
S11

1114 221

7910120224

conditions. A review of recording voltmeter traces show that at no time has the voltage fallen below 98% of nominal voltage even during an unscheduled outage of Brunswick Unit No. 2, and so the minimum switchyard voltage requirements have never been approached.

This study analyzes the Plant Electrical Auxiliary System to provide the following information:

A. Optimum transformer tap settings were determined for various auxiliary transformers.

B. Using the above tap settings, the voltage ranges at the various auxiliary load terminals were determined for the expected generator and 230kv switchyard voltage variations, and for postulated variations in load conditions.

C. Limitation on generator and 230kv switchyard voltage variations were determined. These limitations were established such that equipment design life times would not be decreased under expected normal operating conditions. Under emergency operating conditions, the limits were set to provide proper operation of all safety-related equipment.

The transformer tap settings and switchyard voltage operating parameters from the report ensure that the offsite power supply and Plant Electrical Auxiliary System can start the normal operating loads and emergency loads without shifting emergency loads to the diesel generators during a LOCA or other operating transient. The enclosed study only includes results from Unit No. 2. However, since both units are identical, similar results would be derived from a study on Unit No. 1.

II. ONSITE TEST

No previous test can be utilized to verify the results of the analytical report; therefore, a separate test will be performed by the completion of the next refueling outage.

The test procedure will be as follows:

A. Turbine generator loaded to approximately 25% and all normal loads being powered by unit auxiliary transformer (UAT).

B. Measure voltage on all emergency 4160 volt and 480 volt buses.

C. Institute test signal that will simultaneously trip the turbine/generator, transfer all normal loads from the UAT to the startup auxiliary transformer (SAT), and start the ECCS pumps (RHR and core spray). Measure the voltages listed above during the starting of the ECCS System.

The results will be transmitted to you following completion of the test.

III. The Brunswick Plant transmission network and switchyard are designed in accordance with 10 CFR 50 Appendix A GDC-17. The electric power from the transmission network to the onsite electric distribution system is supplied by two physically independent circuits. These circuits are designed to minimize the likelihood of simultaneous failure. The switchyard is designed to minimize the effect of failures of individual items of equipment so that any single credible event would not interrupt power from the 230kv system network to both startup auxiliary transformers. The switchyard is designed to provide adequate offsite power to start the units, provide power for common auxiliary loads, and when necessary supply power for the engineered safety features for a unit in a design basis accident condition while supplying the auxiliary power requirements for shutdown of the other unit. The auxiliary power system is designed to provide sufficient normal and alternate sources of power to assure a capability for prompt shutdown and continuous maintenance of the plant in a safe condition. By following the conservative guidelines recommended in the enclosed study, the electrical auxiliary system will continue to operate under the identified worse case conditions without transferring emergency loads to the diesel generators.

Yours very truly,

E. E. Utley
Executive Vice President
Power Supply & Customer Services

EEU/jcb

Attachments