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U. S. Nuclear Regulatory Commission
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Subject: River Bend Station - Unit 1
Docket No. 50-458
Special Report - Valid Failure of Division II EDG Due to Fault in Voltage Regulator

File No.: G9.5, G9.25.1.3

RBG-41601
RBF1-95-0138

Gentlemen:

On May 10, 1995, at approximately 2240, the Division II Emergency Diesel Generator (EDG) incurred a valid failure during the performance of its normal monthly surveillance. The unit started normally and attained rated speed and voltage within the Technical Specification requirements. Shortly after the start, plant personnel noticed unusual fluctuations in the generator field and output voltage. While these fluctuation did not exceed the 10 percent voltage tolerance specified in the Technical Specifications, the fluctuations did approach these limits and were sporadic. The system engineer was consulted and the surveillance test was terminated. The terminated performance of this surveillance was classified as a valid test and valid failure in accordance with Regulatory Guide 1.108, Regulatory Position C.2.e.(5).

An initial troubleshooting run was conducted with instruments in place to monitor the voltage control circuitry. The troubleshooting run failed to reproduce the voltage fluctuations experienced during the aborted surveillance. A second performance of the Technical Specification surveillance procedure was attempted and reactive load (KVAR) fluctuations appeared after the EDG was paralleled to the grid and partial load applied. This surveillance was consequently terminated. The terminated performance of this second surveillance test was not counted in the reliability statistics for this EDG based on the guidance provided in Regulatory 1.108 in conjunction with additional clarifying guidance provided in Regulatory

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Guide 1.9 revision 3. Subsequent troubleshooting runs were successful in isolating an intermittent problem in the voltage regulator. Inspection of the module revealed that one end of a jumper wire was loose. The design is such that this loose jumper could cause an additional resistor to be intermittently switched into the signal voltage circuit, changing the signal voltage and thereby changing the generator excitation. At this time, it has been concluded that the loose jumper is the root cause of this failure; however, EOI is pursuing additional testing of the regulator to ensure that no other problem exists. If this additional testing finds an additional problem with the regulator that affects this root cause determination, then a supplemental report will be submitted.

The voltage regulator was replaced with a spare from inventory. The replacement regulator was inspected internally, verifying that a jumper was properly installed. The jumper in the new regulator was found to be of a more durable construction and it is believed that it will not be susceptible to the same failure mode.

A number of maintenance runs were conducted to set up and test the replacement regulator. The voltage was adjusted up and down, and the regulator controlled properly. The voltage stability during starting and testing was well within the acceptance criteria, also indicating proper regulator function. The unit was successfully paralleled with the grid and loaded several times. The reactive load (KVARS) was adjusted with the unit in synchronous operation, and the regulator exhibited proper control. Multiple load rejection tests were conducted at various load levels up to and including a load reject at approximately 3000 kW. During these tests, the regulator controlled properly and the voltage stability was well within the acceptance criteria.

The Division II EDG was declared operable on May 12, 1995, by successfully completing its monthly one-hour surveillance test.

To verify no common mode failure existed, the Division I EDG was demonstrated operable by successfully completing its monthly one-hour surveillance test under STP-309-0201, within 24 hours of the May 10, 1995 Division II EDG failure. On May 24, 1995, the voltage regulator in the Division I EDG system was inspected, and no jumper was found. Research into the signal voltage circuitry found that the regulator can be successfully set up, and will control properly, either with or without the jumper. This as-found condition of the Division I EDG was determined to be acceptable and this inspection provided positive verification that this condition was not a potential common mode failure for the River Bend Division I and II EDG's.

The Division III EDG is equipped with a different voltage regulator, eliminating a possible common mode concern. It was not necessary to operate this EDG as a result of the May 10, 1995 Division II EDG failure.

This valid failure places the Division II in weekly surveillance, per Technical Specification 4.8.1.1.2.a and Table 4.8.1.1.2-1, based on a total of 2 valid failures in the last 20 valid tests. The previous valid failure occurred on May 8, 1994, when, upon starting for a 24-hour run under STP-309-0612, the unit came up with no generator field or output voltage. This failure was isolated to a malfunction in the excitation shutdown relay.

The statistics on the reliability of our EDGs are as follows:

Division I EDG:

No. of Valid Failures in the last 20 Valid Tests =	0
No. of Valid Failures in the last 100 Valid Tests =	2
Current Surveillance Test Frequency =	Monthly

Division II EDG:

No. of Valid Failures in the last 20 Valid Tests =	2
No. of Valid Failures in the last 100 Valid Tests =	2
Current Surveillance Test Frequency =	Weekly

Division III EDG:

No. of Valid Failures in the last 20 Valid Tests =	0
No. of Valid Failures in the last 100 Valid Tests =	1
Current Surveillance Test Frequency =	Monthly

For the failure described in this report, the Division II EDG was unavailable for 42.9 hours.

If there are any questions concerning this issue please contact M. K. Brandon at (504) 381-4506.

Sincerely,

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JJF/MKB/jr

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