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FEB 11 1994

CDR-50-390/94-01
CDR-50-391/94-01

10 CFR 50.55(e)

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

Gentlemen:

In the Matter of the Application of ) Docket Nos. 50-390
Tennessee Valley Authority ) 50-391

WATTS BAR NUCLEAR PLANT (WBN) - DIESEL GENERATOR (DG) TESTING IN PARALLEL WITH OFFSITE POWER - CDR-50-390, 391/94-01 - FINAL REPORT

The purpose of this letter is to provide a report in accordance with 10 CFR 50.55(e). TVA notified Messrs. Paul Frederickson and Peter Tam of the NRC by telephone on November 12, 1993 that information relating to this issue contained in a letter dated August 5, 1993 was in error. Subsequently, the subject deficiency documented as Significant Corrective Action Report (SCAR) WBSCA930199 was determined to be reportable under 10 CFR 50.55(e) and was reported to the NRC Operations Center on January 12, 1994. Enclosure 1 to this letter contains TVA's final report on this subject. Enclosure 2 provides a list of commitments made in this submittal.

If you have any questions, please telephone P. L. Pace at (615) 365-1824.

Very truly yours,

W. J. Museler

William J. Museler

Enclosure
cc: See page 2

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT (WBN) - UNITS 1 AND 2
DIESEL GENERATOR TESTING IN PARALLEL WITH OFFSITE POWER
CDR 50-390/94-01 AND CDR 50-391/94-01
FINAL REPORT

DESCRIPTION OF DEFICIENCY

Regulatory Guide (RG) 1.108, Revision 1, Regulatory Position C.1.b(3) states: "Periodic testing of diesel generator units should not impair the capability of the unit to supply emergency power within the required time. Where necessary, diesel generator unit design should include an emergency override of the test mode to permit response to bona fide signals."

In complying with the above regulatory position (subsequently superseded by Regulatory Position 1.5 of RG 1.9, Revision 3 which has the same intent), TVA originally determined that if the diesel generator (DG) is in the test mode (parallel with the offsite power system) and should a loss of offsite power (LOOP) concurrent with an SI occur, then the following sequence would take place:

1. DG breaker will be tripped by an instantaneous overcurrent relay.

2. The diesel will be aligned to the emergency mode.

3. The safety injection (SI) loads will be sequenced on by the DG loading logic.

However, TVA has discovered that this sequence is not valid for all LOOP conditions. Specifically, a loss of transformer pressure or a ground fault on a Common Station Service Transformer (CSST) associated with the DG in test will first trip the 6.9 kV shutdown board's offsite power feeder breaker. This will disable the instantaneous overcurrent relay, and result in the diesel generator attempting to simultaneously start all of the SI loads. This would exceed the capability of the diesel generator.

SAFETY IMPLICATIONS

The DG specification requires that the DG be capable of recovering from an accidental concurrent start of 2000 hp of 6600 volt motors. The SI signal will start the 6600 volt safety injection, residual heat removal, auxiliary feedwater, centrifugal charging, and containment spray pump motors. Except for the centrifugal charging pump (CCP), all of the listed pumps would not be running, and in all likelihood, the CCP on the other train would be running rather than the CCP on the board associated with the DG being tested. Without the CCP, the cumulative nameplate horsepower for the pump motors is 2100, and with the CCP, the nameplate is 2700. Also, the accident horsepower requirements for some of the 6600 volt motors, operating in their service factors, are greater than the nameplate. In addition to the above motors, several 460 volt motors for such

loads as motor operated valves (MOVs), fans, and small pumps also receive a start command simultaneously with the large pumps. As a result, these loads will exceed the specified requirements of the DG. In worst case conditions, the DG would be incapable of recovering to perform its function to supply emergency power to the SI loads.

CAUSE OF THE DEFICIENCY

Design Change Notice (DCN) M-12051-C installed a trip to the 6.9 kV shutdown board's normal feeder breaker for an electrical fault in the transformer yard or at the Watts Bar Hydro Plant. With this feeder breaker being tripped for an electrical fault such as described above, the DG's instantaneous overcurrent relays are inhibited from tripping the DG breaker. Previously, had a loss of coolant accident (LOCA) occurred when the DG was in parallel with the offsite power source, the DG's instantaneous overcurrent relays would have tripped the DG feeder breaker and protected the DG from the overload condition resulting from the simultaneous start of the SI loads.

TVA has determined that this condition was a result of personnel error given the complexity of this design and is isolated to this occurrence. To confirm this conclusion, a review was performed of several recent corrective action documents which identified deficiencies attributed to design errors. This review found no case where complex design was attributed to the identified deficiency. Additionally, a management assessment report for Problem Evaluation Report WBPER920284 concluded the errors introduced into DCNs is not pervasive, with off-line reviews conducted by four independent organizations not detecting any significant error rates.

Furthermore, discussions with system engineers and system reviews conclude that only NSSS supplied equipment and systems would be as complex as the system of concern. However, TVA relies upon NSSS vendor to assure correctness of their designs.

CORRECTIVE ACTIONS

TVA has issued DCN M-28201-A which corrects this deficiency and re-establishes compliance with regulatory requirements. This design change modifies the DG control circuit to trip the feeder breaker of any DG in the test mode and operating in parallel with offsite power whenever a SI signal or an offsite fault signal associated with the 6.9 kV shutdown board's normal feeder breaker is actuated. Tripping open the DG feeder breaker satisfies a control logic interlock within the accident response circuits so that the SI signal will realign the DG to its "emergency start" mode and override the manual controls used in its test mode. Also, opening the DG feeder breaker when LOOP conditions exist ensures that the 6.9 kV shutdown board is deenergized and that its undervoltage relays will initiate load-shedding. Once the DG is in its emergency start mode and loads have been stripped from the shutdown board, control circuits associated with load shedding logic and DG voltage/speed signals close the DG output breaker to reenergize the 6.9 kV shutdown board and start the DG load sequencer. The load sequencer then connects emergency loads to the shutdown board in a preset time sequence.

DCN M-28201-A will be implemented prior to Unit 1 fuel load. Since this condition was determined to be isolated to this occurrence, no additional recurrence control actions are considered necessary.

ENCLOSURE 2

LIST OF COMMITMENTS
CDR 50-390/94-01 AND CDR 50-391/94-01
FINAL REPORT

1. DCN M-28201-A will be implemented prior to Unit 1 fuel load.