

## CHATTANOOGA, TENNESSEE 37401

November 8, 1985

BLRD-50-439/84-49

Region II

101 Marietta Street, NW, Suite 2900

Atlanta, Georgia 30323

Dear Dr. Grace:

BELLEVILLE NUCLEAR PLANT UNITS 1 AND 2 - VARIOUS DEFICIENCIES INVOLVING LAMBDA  
POWER SUPPLIES - BLRD-50-438/84-53 AND BLRD-50-439/84-49 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector P. E. Fredrickson on October 25, 1984 in accordance with 10 CFR 50.55(e) as NCR 3511. Our interim reports were submitted on November 20, 1984 and February 27 and May 21, 1985. Enclosed is our final report. We consider 10 CFR Part 21 applicable to this deficiency.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

J. A. Domes  
J. W. Hufham, Manager  
Licensing and Risk Protection

Enclosure

cc: Mr. James Taylor, Director (Enclosure)  
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ENCLOSURE  
BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2  
VARIOUS DEFICIENCIES INVOLVING LAMBDA POWER SUPPLIES  
BLRD-50-438/84-53, BLRD-50-439/84-49  
NCR 3511  
10 CFR 50.55(e)  
FINAL REPORT

Description of Deficiency

Various deficiencies have been identified with the Lambda power supplies installed in Bailey Controls Company (BCCo) cabinets at Bellefonte Nuclear Plant (BLN). The BCCo cabinets were supplied to TVA by Babcock and Wilcox (B&W) of Lynchburg, Virginia, on the NSSS contract for BLN. The Lambda power supplies are components of the reactor protection system (RPS), engineered safety features actuation system (ESFAS), essential controls and instrumentation (ECI) system, and the non-nuclear instrumentation (NNI) system. The RPS, ESFAS, ECI, and NNI systems are primary safety-related systems which, among other essential functions, provide protection to the reactor core during a loss of coolant accident (LOCA), a steam line break, or a feedwater line break. The subject deficiencies involve missing components, loose connections, incorrectly sized capacitors, corroded transformers, and others. The root cause of the power supply failures can be summarized in the following categories:

- (a) Storage related problems, due to storage of power supplies in high humidity and in an unenergized state, resulting in transformer corrosion and failed capacitors.
- (b) Documentation related problems where components were apparently missing or improperly sized due to improper correlation of different revisions of the power supplies to different revisions of the instruction manual data, resulting in an apparent discrepancy between the component and the documentation.
- (c) Manufacturing quality problems, due to insufficient quality controls, resulting in missing or improperly installed components.
- (d) Power supply electrical problems, due to high stress on the power supplies caused by re-energization after long periods of storage, and random component failures, resulting in improper regulation, excessive ripple, and improper output voltage.
- (e) Miscellaneous problems, primarily due to improper handling, resulting in component damage.

TVA has determined that this deficiency is not a generic condition adverse to quality (CAQ) for TVA. The Lambda power supplies are used only at BLN in the BCCo instrumentation systems.

### Safety Implications

The subject deficiencies could have rendered an affected system inoperable or unable to perform a specific required safety function. The functions of the affected system are necessary for protection of the plant and/or the mitigation of the consequences of some design basis accidents. Therefore, these deficiencies could have adversely affected the safe operation of the plant.

### Corrective Action

TVA has returned the defective power supplies to the vendor for repair or replacement and to test them to ensure correctness and acceptability. TVA will reinstall the power supplies after they are returned from the vendor. This corrective action will be completed for unit 1 and unit 2 by one year before fuel load of the applicable unit.

TVA has coordinated the following action to prevent recurrence with the vendor:

- (a) For storage-related problems, B&W will add procedures to the instruction manual requiring that power supplies be stored in an energized state; and if de-energized for extended periods, power will be resupplied at reduced levels.
- (b) For documentation related problems, B&W will add guidelines to the instruction manual to allow site personnel to identify the version of each power supply and relate it to the proper version of the instruction manual. This addition will also include a standardized test procedure and specific acceptance criteria to ensure that a power supply is not mistakenly identified as defective.
- (c) For manufacturing quality problems, BCCo will improve its internal procedures for handling Lambda power supplies, including inspection of all power supplies before return shipment, testing of power supplies in accordance with the new test procedure, and improving the method of control and inspection of returned power supplies.
- (d) For power supply electrical problems, B&W will add procedures to the instruction manual providing power supply startup guidance (i.e., resupply power at reduced levels if power supplies have been de-energized for an extended period).
- (e) For miscellaneous problems, BCCo will implement additional inspections of the power supplies in the shop to preclude broken components.

This action to prevent recurrence is scheduled to be complete by July 1, 1986.