TENNESSEE VALLEY AUTHORITY
KNOXVILLE, TENNESSEE 37902

OCT 9 1984

84 OCT 15 P1:42

Mr. James P. O'Reilly, Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta Street, NW., Suite 2900
Atlanta, Georgia 30323

Dear Mr. O'Reilly:

TENNESSEE VALLEY AUTHORITY - BROWNS FERRY NUCLEAR PLANT (BFN) UNITS 1, 2, AND 3 - DOCKET NOS. 50-259, -260, AND -296 - FACILITY OPERATING LICENSES DPR-33, -52, AND -68 - 10 CFR 21 REPORT

During routine inspections of the low pressure coolant injection (LPCI) motor generator (mg) sets, increased vibration in the pillowblock bearing on unit 1 LPCI mg set 1DN has been noticed since May 1, 1984. The mg set was removed from service for bearing replacement on July 10, 1984. The original bearing was reinstalled (because of material delivery difficulties in obtaining a new bearing) and the mg set restarted. The breaker feeding the mg set motor tripped and investigation revealed that the generator had failed. A spare mg set was installed. The mg set was removed from service and returned to Louis-Allis Company on September 4, 1984, for failure analysis and repair. The generator was disassembled at the Louis-Allis plant on September 5, 1984. Cracks were found in three out of four of the coil clamps and a rectifier mounting ring was loose. On August 8, 1984, unit 2 mg set 2DA was removed from service due to high vibration although it was operating properly. This generator was disassembled on August 14, 1984, at TVA's Power Service Shop, and inspection revealed that one of the coil clamps was broken apart and the other three coil clamps had cracked. The rectifier ring was also loose. This failure was similar to the unit 1 mg set failure.

There are four of these mg sets in each unit at BFN. They supply two separate sources of power from the 480V shutdown boards to the reactor MOV boards D and E. These reactor MOV boards provide motive power to valves associated with the LPCI made of the residual heat removal system. Failure of a single mg set could result in a loss of a redundant power supply to either the D or E reactor MOV board associated with the set.

These mg sets were manufactured by

Louis-Allis Company
427 E. Stewart Street
P.O. Box 2020
Milwaukee, Wisconsin 53201

OFFICIAL COPY

IE19

OCT 9 1984

Mr. James P. O'Reilly

This problem is reportable under 10 CFR 21 and was reported to me on October 5, 1984. I made verbal notification to you on October 5, 1984. The enclosed Part 21 report from BFN contains additional information on this matter.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

H. G. Parris

H. G. Parris
Manager of Power and Engineering

Enclosure

Tennessee Valley Authority
Browns Ferry Nuclear Plant

EVALUATION LOGIC FOR PART 21

PROBLEM: Cracking of LPCI M-G Set Generator Coil Clamps and Rectifier Mounting Rings

IDENTIFIED BY: Maintenance Request No. A-266169

A. Does the problem involve:

1. Failure of goods and services to comply with applicable NRC requirements (regardless of whether these requirements are included in the procurement document). Yes / / No /X/ (If yes, go to D)
2. A procured basic component failure resulting in a condition or circumstance that could contribute to exceeding a safety limit as defined by plant technical specifications. Yes /X/ No / / (If yes, go to B)
3. Departure of a delivered component or service from the technical requirements of a procurement document. Delivery occurs upon acceptance by NUC PR (e.g., at receipt inspection). Yes / / No /X/ (If yes, go to B)

Answer all 3 questions above. If all "No's", GO TO C. If any "Yes's", GO TO "B."

B. Is component necessary to ensure:

1. The integrity of the reactor coolant pressure boundary Yes / / No /X/
2. The capability to shut down the reactor and maintain it in a safe shutdown condition (example, IEEE Class 1E Electrical, Seismic cat. 1) Yes /X/ No / /
3. The capability to prevent or mitigate the consequences of accidents Yes /X/ No / /
4. Is security system deficiency involved? Yes / / No /X/

If all "No's", GO TO C - If any "Yes's" - GO TO D

C. Evaluation for Services

1. If this is a repair service, would the item being repaired be procured as a "Commercial Grade" item? If "Yes", 10 CFR 21 does not apply, go to "E." If "No", go to C-2. Yes / / No / /
2. Could the service being procured cause a defect in a basic component or are the services connected with the design, inspection, testing, or consulting services important to safety that are associated with a basic component. If "Yes", 10 CFR 21 applies. Go to "E." If "No", 10 CFR 21 does not apply; go to "E." Yes / / No / /

D. Could the defect have caused a substantial safety hazard? (By definition, item A2 constitutes a substantial safety hazard.) Yes /X/ No / /

If "No", this item is not reportable - If yes, this item is reportable under Part 21

E. Is this item reportable by NUC PR under Part 21? Yes /X/ No / /

*Revision

Tennessee Valley Authority
Browns Ferry Nuclear Plant

EVALUATION LOGIC FOR PART 21 (Continued)

* Submitted: Walter L. Christopher /Date 9/11/84

Reviewed: _____ / 10/4/84
Compliance Staff Supervisor / Date

Approved: J. R. Butler / 10/4/84
PORC Chairman / Date

cc: Compliance Supervisor

Retention: Period - Lifetime; Responsibility - Document Control Supervisor

*Addendum

Tennessee Valley Authority
Browns Ferry Nuclear Plant

Form BF 145
BF 15 23
7/26/82

Attachment 1

Part 21
Report # ___

PART 21 REPORT

Plant Browns Ferry Nuclear Plant References Technical Specifications Sections 3.5 and 3.9.

Component or System Identification See Attachment A

Supplier of Component Louis-Allis Company

Nature of Defect or Noncompliance and Cause See Attachment A

Extent of Safety Hazard See Attachment A

Date Which Defect or Noncompliance Was Discovered September 5, 1984

Number of Identical Components in Use Twelve (four per unit)

Location of Components Elevations 621 and 639 of Reactor Building

Corrective Action and Recurrence Control Taken or To Be Taken See Attachment A

Expected Completion Date See Attachment A (Corrective Action and Recurrence Control Taken or To Be Taken)

Has defect or noncompliance been reported previously? Yes / / No / X /

If yes, by what means? N/A.

Walter L. Christopher — Submitted by — 9/11/84 Date

J. R. Bynum — PORC Review — 9/14/84 Date

J. R. Bynum — Superintendent Approval — 9/14/84 Date

Retention: Period - Lifetime, Responsibility - Document Control Supervisor

ATTACHMENT A

Component or System Identification

Low Pressure Coolant Injection (LPCI) Motor Generator (mg) sets, system No. 268.

Nature of Defect or Noncompliance and Cause

The coil clamps and rectifier mounting ring in the generator rotor are cracking. The cracking appears to be caused by thermal expansion of the phenolic material of which the clamps and rings are made. This defect increases the probability of a generator failure.

Extent of Safety Hazard

The LPCI mg sets provide power to 480V reactor motor-operated valve (RMOV) boards D and E. Each RMOV board has two LPCI mg sets associated with it, one for the normal power supply and one for the alternate power supply. These RMOV boards provide motive power to valves associated with the LPCI mode of the Residual Heat Removal System (RHR). Failure of a coil clamp or rectifier mounting ring can result in a generator failure which would result in a loss of redundant power supply to the RMOV board associated with the mg sets.

The LPCI mg sets were installed during the following refueling outages: unit 1 cycle 4, unit 2 cycle 4, and unit 3 cycle 3.

The cracked coil clamps and loose rectifier mounting ring problem was identified by the following two incidents:

1. Mechanical Results Section had noticed increased vibration in the pillowblock bearing (motor side) on LPCI mg set 1DN since May 1, 1984. On July 10, 1984, the mg set was removed from service for bearing replacement. During the bearing changeout, due to material receipt problems, the original bearing was reinstalled and the mg set restarted. The breaker feeding the mg set motor then tripped. Investigation revealed that the mg set generator had failed.

   The mg set was returned to Louis-Allis, the manufacturer, for a failure analysis. On September 5, 1984, the generator was disassembled by Louis-Allis. Cracks were found in three out of four of the coil clamps, and the rectifier mounting ring was loose. The actual cause of the generator failure has not yet been determined.

2. On August 8, 1984, LPCI mg set 2DA was removed from service due to high vibration. Initial inspection revealed pieces of a phenolic material in the end caps. On August 14, 1984, the generator was disassembled. One coil clamp was found to have completely broken apart and the remaining three clamps were cracked. The rectifier mounting ring was loose. There was no generator failure on this mg set.

Corrective Action and Recurrence Control Taken or To Be Taken

Loss of the following LPCI mg set generators would be annunciated in the respective unit main control room: 1DA, 1DN, 2DA, 2DN, 2EN, 3EN, and 3DN. Loss of LPCI mg set generators 1EA, 2EA, 3DA, and 3EA would not be annunciated. The normal and alternate supply voltage level to RMOV boards 1E, 3D, and 3E will be checked once per shift until repairs are complete. The supply voltages to RMOV board 2E will not be checked since unit 2 is in a refueling outage and repairs will be complete before the unit is restarted. Mechanical Results Section also checks vibration levels on all LPCI mg sets once per month. The annunciation and voltage checks will provide early detection of a generator failure and vibration checks will provide early indications of coil clamp and/or rectifier mounting ring problems.

Louis-Allis has revised the design of the coil clamps such that they will maintain the same physical dimensions but will be made of 6061/T6 aluminum block. Louis-Allis is currently in the process of designing a new rectifier mounting ring. The new coil clamps and rectifier mounting rings will be installed in all LPCI mg sets by the end of the next refueling outage for each unit (unit 2 cycle 5, unit 1 cycle 6, and unit 3 cycle 6).