



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

Docket No. 50-260

SEP 1 1988

LICENSEE: Tennessee Valley Authority
FACILITY: Browns Ferry Nuclear Plant, Unit 2
SUBJECT: SUMMARY OF THE AUGUST 10, 1988 MEETING WITH TENNESSEE VALLEY
AUTHORITY ON THE DIESEL GENERATOR CONCERNS RESULTING FROM BROWNS
FERRY RESTART TEST PROGRAM (TAC 62264)

On Wednesday August 10, 1988, a meeting was held in the Browns Ferry Nuclear (BFN) Plant Site Engineering Building Conference Room, Decatur, Alabama, with the Tennessee Valley Authority (TVA). The meeting was held to discuss diesel generator concerns resulting from the Restart Test Program.

The attendance list is included as Enclosure 1. The agenda is included as Enclosure 2. Pertinent points made during the discussion are enumerated below identified by the agenda item number and description. TVA provided point papers for agenda items 4 through 7; these are included as Enclosure 3. At the close of the meeting, the senior TVA and staff members responsible for the meeting signed a list of items to be provided by either party and included a due date for transmittal. This list is included as Enclosure 4.

Agenda Item 1. RHR pump motor breaker problem

The problem is one occurrence of incomplete contact. The failure could be attributed to any of the following:

- ° S2 interlock switch had a loose nut
- ° Pitting on the MG2 secondary contact
- ° Guide rail was distorted

This breaker is tested once per month in the "racked-in" position by starting the RHR pump. There are 30 to 40 of this type of breakers per unit. Other breakers of this type have exhibited the same symptoms. However, this failure occurred once during five LOP/LOCA tests so that TVA concludes at this point it is not a generic problem. CAQR Number BFP 880518 was initiated July 26, 1988. The staff requested a copy of the CAQR close out package to be provided when completed. TVA reported that preventive maintenance on this breaker had failed through the crack. TVA is reviewing the preventive maintenance procedure, EMI-7 (copy of EMI-7 was provided to the Resident Inspector). Improvements will be applied to each of the four breakers involved. The staff will review the maintenance procedure and the CAQR closeout package to determine if anything additional will be requested.

Agenda Item 2. Load Transfers (Single Failure Considerations)

This concerns the possibility of load transfer from one diesel to another between redundant divisions. An example was given where diesel A supplying power to LPCI fails and transfers the load to diesel C. Both diesels are connected to shutdown bus 1. This transfer was from division 1 to division 2. BFN unit 2

ADOL
11

has two divisions. It was determined that the staff had previously approved this transfer scheme with M.G. sets used as isolation devices.

IE Report 84-20, item 1.A (violation) addresses the inability to parallel the diesel generator to the grid in the presence of an accident signal. TVA informed the staff that this paralleling is used only for testing. However, it was necessary to remove the accident signal from the circuit in order to parallel the diesels. The Resident Inspector will close out this item based on the LOP/LOCA C test results.

Agenda Item 3. Modification of Antipump on DG Output Breakers Failed During LOP/LOCA Test June 8, 1988

TVA has modified the circuit to provide a time delay sufficient for the anti-pump circuit to recharge. TVA is analyzing the effect of this time delay on the present accident analysis. The staff requested TVA include their analysis of the modified circuit in the CAQR closure package so that the staff can determine the acceptability of the fix.

Agenda Item 4. GE Dynamic Load Analysis - Status of Progress.

TVA provided a handout for agenda items 4 through 8, which is included as Enclosure 3. The GE Dynamic Load Study is on hold until completion of Diesel Generator load acceptance tests.

Agenda Item 5. Bechtel Load Analysis Calculations (refer to Enclosure 3)

° Status of progress.

Bechtel is currently revising its calculations. The bottom line for this analysis is to determine steady state diesel loads during the accident conditions or loss of offsite power.

Agenda Item 6. Load Acceptance Test Results (refer to Enclosure 3)

The GE Dynamic Load Analysis is tied in with the load acceptance tests. As stated above, the GE analysis is on hold until test results are in. TVA is making some adjustments. TVA will retest the DGs for Units 1 and 2, A-D, load acceptance. TVA is redoing these tests to stay within the bounds of the DG vendors analysis. TVA will complete the final tests of the C and D diesels in September 1988.

Agenda Item 7. Woodward Governor Control Problem Review (refer to enclosure 3)

TVA is endeavoring to improve the governor response during the time that the largest emergency load is starting on the diesel generator. The fuel racks did not respond rapidly enough during the initial one second interval when the RHR pump motor load is applied to the Diesel Generator. The Woodward Governor Company has recommended changes to improve governor performance.

Agenda Item 8. Anticipated Technical Specification Changes

TVA stated there are possibly two Technical Specification changes which they are considering.

- ° The present Technical Specifications require testing of the diesel generator to 2/3 of the manufacturer's rating. TVA will make a decision in mid September whether or not to submit a Technical Specification change.
- ° TVA is also considering making a minor Technical Specification change increasing the volume of diesel fuel stored for use by the emergency diesel generators.

Agenda Item 9. Major Test Exceptions

TVA went through the list of major test exceptions. The resident inspectors are evaluating all the test exceptions. They will ask for HQ assistance if required. Major exceptions are as follows:

- ° Diesel Generator governor adjustments during 24 hour load runs. (See agenda item 7).
- ° DC output breaker closed and tripped. TVA found a galvanometer closed and shorted out.
- ° RHR service water pump No. 1 failed to close a valve. Start circuit was defeated.
- ° PPS MA set - Drive breaker failed to trip due to a defective timer.

Agenda Item 10. Closeout of Items Identified in Inspect on Reports

1. IE Report 86-06-03 URI Unanalyzed AC auxiliary power system load configuration.

OSP/ROB will close out by issuing SE on Diesel Generators

2. LER 296/L8001 Generator breaker logic design deficiency identified during LOP/LOCA testing.

This LER deals with the antipump problem on the diesel generator output breaker. (See agenda item 3 above) The CAQR closeout package will be reviewed by the Resident Inspector and OSP/ROB. Resident Inspector will close out the issue based on the TVA CAQR closeout package.

3. IE Report 84-20 item 1.A (violation) inability to parallel the diesel generators in the presence of an accident signal.

(See agenda item 2 above)

The Resident Inspector will close out this action based on the test results of the BFN LOP/LOCA C - Test.

4. IE Report 87-33-05 URI Existing surveillance procedures not adequately meeting technical specifications nor General Design Criteria 18 requirements for testing.

TVA plans to bring all the Woodward governors into specification, then perform the load acceptance test. The Resident Inspector will close out this item based on the load acceptance test results together with the OSP SE on Diesel Generators.

5. IE Report 88-04-05 Diesel generator field breaker tripping during
IFI fuel consumption run.

The DG was brought up to 2950 kW and had run for one half hour when the breaker tripped. This item will be closed out by the Resident Inspector when the 24 hour load run is completed successfully.

6. LER 259/87025 Failure to test 480V shutdown board loads.

The LER states this failure problem was resolved. This item will be closed out by the Resident Inspector after observation of a successful completion of the 24 hour load run.

7. IE Report 86-72 Electrical calculations program to develop and
item U5.3-4 issue procedure for preparation of diesel
(Design deficiencies) generator loading calculations.

OSP issuance of the SE on diesel generators will close out this item.

8. LER 259/87005 Perform inspection of all components and
connections of the diesel generator voltage
control system.

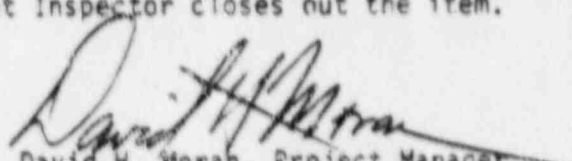
The Resident Inspector will close out this item upon observation of successful completion of the 24 hour load run.

9. IE Report 85-57-06 Diesel generator oil pressure light upgrade
item 06 (violation) response procedure.

The Resident Inspector will close out this item by inspection of the upgrade.

10. LER 259/87008 Repair the diesel generator 3ED control
cabinet damage as a result of the failure
of the potential transformer fuse contact.

The Resident Inspector will inspect the hardware fix and review the supporting documentation. The Resident Inspector's findings will be coordinated with OSP before the Resident Inspector closes out the item.


David H. Morah, Project Manager
TVA Projects Division
Office of Special Projects

Enclosures:
As stated

CC:
General Counsel
Tennessee Valley Authority
400 West Summit Hill Drive
E11 B03
Knoxville, Tennessee 37902

Mr. R. L. Gridley
Tennessee Valley Authority
5N 157B Lookout Place
Chattanooga, Tennessee 37402-2801

Mr. C. Mason
Tennessee Valley Authority
Browns Ferry Nuclear Plant
P.O. Box 2000
Decatur, Alabama 35602

Mr. M. J. May
Tennessee Valley Authority
Browns Ferry Nuclear Plant
P.O. Box 2000
Decatur, Alabama 35602

Mr. D. L. Williams
Tennessee Valley Authority
400 West Summit Hill Drive
W10 B85
Knoxville, Tennessee 37902

Chairman, Limestone County Commission
P.O. Box 188
Athens, Alabama 35611

Claude Earl Fox, M.D.
State Health Officer
State Department of Public Health
State Office Building
Montgomery, Alabama 36130

Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta Street, N.W.
Atlanta, Georgia 30323

Resident Inspector/Browns Ferry NP
U.S. Nuclear Regulatory Commission
Route 12, Box 637
Athens, Alabama 35611

Dr. Henry Myers, Science Advisor
Committee on Interior
and Insular Affairs
U. S. House of Representatives
Washington, D.C. 20515

Tennessee Valley Authority
Rockville Office
11921 Rockville Pike
Suite 402
Rockville, Maryland 20852

Mr. S. A. White
Senior Vice President, Nuclear Power
Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

LICENSING MEETING - ATTENDANCE LIST

SUBJECT Discussion of David Carpenter Concerns

DATE 9/10/87 TIME 8:30

NAME (PLEASE PRINT)	ORGANIZATION	MAILSTOP	PHONE NO.
David H. Morgan	US NRC		301-492-2076
Jim Hutson	TVA/DUE		615-632-2428
JEFF NICKEL	TVA/DUE		5128
Ed Freeman	TVA - Systems Eng		205 729-3241
E.F. CHRISTNOT	US-NRC	RES. INSP.	
D. R. Carpenter	NRC - SRI		
Don Lerner	TVA - Reactor	BFN	204-3100
Hukam Garg	RES. NRC/OSP	HQ	301-492-073
ANGELO MARINO	NRC/OSP	"	301-492-32
David Skridulis	TVA - Licensing		X2676
Barry ZACHMAN	NRC		301-492-07
CARROLL McFALL	TVA-LICENSING	BFN	2046
B.C. Morris	TVA-LICENSING	BFN	3604
MASAUD BAJESTANI	TVA-SYSTEMS	BFN	X2428
VICTOR SCHWARTZ	TVA-PROJ. MGT.	BFN	X2919
Paul Spaidel	TVA DUE	DUE-AID	5014
MJ MAY	TVA - LIC.	PARA	3566
J.C. HASKANEY	TVA - RTP	BFN	3272
J.M. Hammond	TVA-QAS	BFN	2037

ENCLOSURE

Wednesday August 10, 1988

Meeting with TVA on Browns Ferry Nuclear Plant, Unit 2
to Discuss Diesel Generator Concerns Resulting from
the Restart Test Program

Meeting Agenda

1. RHR Pump Motor Breaker Problem.
2. Load Transfers (Single Failure Considerations).
3. Modification of antipump feature on DG Output Breakers - Failed during LOP/LOCA C Test June 8, 1988.
4. GE Dynamic Load Analysis - Status of Progress.
5. Bechtel Load Analysis Calculations - Status of Progress.
6. Load Acceptance Test Results.
7. Woodward Governor Control Problem Review.
8. Anticipated Technical Specification Changes.
9. Major Test Exceptions.
10. Close Out of Items Identified in Inspection Reports.

4 GE DYNAMIC LOAD ANALYSIS

OBJECTIVE: To bound the Diesel Generator Load Acceptance test results by analysis.

STATUS: On hold until completion of Units 1 and 2 Load Acceptance Tests

REMAINING WORK:

1. Revise existing model to incorporate test results for the Diesel Generator excitation and governor control systems.
2. Perform full voltage and frequency simulation for the Unit 1 and 2 Diesel Generators.

SCHEDULE: Prior to restart

0145e-1

5 DIESEL GENERATOR LOADING ANALYSIS REVISION

OBJECTIVE: To update the original analysis to reflect actual operating conditions of several loads, including LPCI MG sets and RHR pumps, to more accurately reflect loading margins and modifications since original analysis.

STATUS: Bechtel is presently revising the calculations.

SCHEDULE: August 12, 1988

0145e-2

6 LOAD ACCEPTANCE TESTING

OBJECTIVE:

1. To optimize the Diesel Generator governor control and voltage excitation systems in accordance with vendor recommendations.
2. Perform and document by test results the response of the Diesel Generator systems during a full load simulation of a LOOP/LOCA for Unit 1 and 2 and with a reduced load for Unit 3.

STATUS:

1. Items 1 and 2 were initially completed (reduced load on Diesel Generator 1C, 1D) on July 8, 1988.

The Diesel Generators, demonstrated their ability to accept and accelerate under the applied load, however, evaluation of the data revealed different governor control system responses for each of the Diesel Generators. As a result, additional adjustments and modifications are required and items 1 and 2 for the governor control system and item 3 will be re-performed.

SCHEDULE: Prior to fuel load

7
WOODWARD GOVERNOR CONTROL SYSTEM PROBLEMS

OBJECTIVE: Improve the governor response during the time that the largest emergency load is starting on the Diesel Generator.

DISCUSSION: The fuel rack remains unchanged during the initial second when the RHR pump motor is applied to the Diesel Generator because of insufficient voltage (below the designed operating voltage) supplied to the Electric Governor Acuator (EGA).

ACTION: Woodward Governor has made the following recommendations for improvements in the Governor control system:

ADJUSTMENTS:

1. Change the EGA null voltage to a more negative voltage setting which will force the fuel racks to integrate toward a higher fuel position during the depressed voltage.
2. Lower the speed setting of the Mechanical Governor to limit the possibility of an overspeed trip. *from 6400 to 6300*
3. Add droop to the Mechanical Governor to dampen the transient from the Electric Governor to the Mechanical Governor.

HARDWARE:

Replacement of all old EGA controls to make all the controls the same (on 3 of the 9 Diesel Generators).

STATUS: Work is presently in progress

SCHEDULE: Prior to fuel load

0145e-1

8/10/88

Discussion of Diesel Generator Concerns
Agreements resulting

TVA provide

1. CAQR on DG breaker problem resolution to NRC HQ & Resident Inspector. 9/12³⁰/88
2. Copy of TVA response to SSFI team DG Findings; to resident inspector 8/17/88
3. Number and title of NEDD document on reduced voltage starts of KAK pumps 8/12/88
4. Summary report on Load Acceptance Test results and Debital load calculations. Report to include tables of test results and discussion of these results: To NRC HQ 11/15/88 & OSP SER TO TVA 1/15/89.
5. DFN will review feasibility of a Tech Spec. change concerning monthly and refuel type testing: TO NRC HQ 9/15/88.

~~6. TVA Disposition on into transfer of AOS buses between redundant divisions. Letter to NRC HQ~~

NRC: *[Signature]* 8/10/88
[Signature] 8/10/88

TVA *[Signature]*
 TVA *[Signature]*

- 5. IE Report 88-04-05 Diesel generator field breaker tripping during
IFI fuel consumption run.

The DG was brought up to 2950 kW and had run for one half hour when the breaker tripped. This item will be closed out by the Resident Inspector when the 24 hour load run is completed successfully.

- 6. LER 259/87025 Failure to test 480V shutdown board loads.

The LER states this failure problem was resolved. This item will be closed out by the Resident Inspector after observation of a successful completion of the 24 hour load run.

- 7. IE Report 86-72 Electrical calculations program to develop and
item U5.3-4 issue procedure for preparation of diesel
(Design deficiencies) generator loading calculations.

OSP issuance of the SE on diesel generators will close out this item.

- 8. LER 259/87005 Perform inspection of all components and
connections of the diesel generator voltage
control system.

The Resident Inspector will close out this item upon observation of successful completion of the 24 hour load run.

- 9. IE Report 85-57-06 Diesel generator oil pressure light upgrade
item 05 (violation) response procedure.

The Resident Inspector will close out this item by inspection of the upgrade.

- 10. LER 259/87008 Repair the diesel generator 3ED control
cabinet damage as a result of the failure
of the potential transformer fuse contact.

The Resident Inspector will inspect the hardware fix and review the supporting documentation. The Resident Inspectors findings will be coordinated with OSP before the Resident Inspector closes out the item.

Original signed by
David H. Moran, Project Manager
TVA Projects Division
Office of Special Projects

Enclosures:
As stated

DFC	:OSP:TVA/LA	:USP:LA/PM	:OSP:TVA/PM	:TVA:AD/P	:	:	:
NAME	:MSigners	:Doughan:dw	:AMarinos	:SBlair	:	:	:
DATE	:1/88	:4/30/88	:YB/188	:9/1/88	:	:	:

DISTRIBUTION FOR MEETING SUMMARY DATED: SEP 1 1988

Facility: Browns Ferry Nuclear Plant, Units 1, 2 and 3*

Docket File

NRC PDR

Local PDR

Projects Reading

OSP Reading

J. Partlow

S. Richardson

S. Black

B. D. Liaw

D. Moran

M. Simms

F. McCoy

J. Rutberg

H. Garg

A. Marinos

E. F. Christnot

H. Garg

B. Zalcmán

ACRS (10)

GPA/PA

GPA/CA (M. Callahan) (5)

F. Miraglia

E. Jordan

B. Grimes

P. Gwynn

J. Scarborough

T. Elsasser

C. Ader

BFN. Rdg. File

G. Gear

*cc: Licensee/Applicant & Service List

DFol
1/1