

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-317/84-16
50-318/84-16

Docket Nos. 50-317 and 50-318

License No. DPR-53 and DPR-69 Priority -- Category C

Licensee: Baltimore Gas and Electric Company
P.O. Box 1475
Baltimore, Maryland 21203

Facility Name: Calvert Cliffs Nuclear Power Plant
Units 1 and 2

Inspection At: Lusby, Maryland

Inspection Conducted: June 4-8, 1984

Inspectors: *N. Blumberg* 6/25/84
N. Blumberg, Lead Reactor Engineer date

Approved by: *L. Bettenhausen* 7/12/84
L. Bettenhausen, Chief, Test Programs date
Section, Engineering Programs Branch

Inspection Summary:

Inspection on June 4-8, 1984 (combined Inspection Report 50-317, 318/84-16)

Areas Inspected: Routine, announced inspection of verification of completion of TMI Action Item, Auxiliary Feedwater System Modification, post modification testing, facility procedure and drawing updating, and QA/QC interfaces. The inspection involved 36 inspector hours on-site by one region based inspector.

Results: One violation in one area (Violation - Failure to establish procedures for incomplete work followup - paragraph 2.7).

1. Persons Contacted

R. Androsik	Electrical and Controls (E&C) Surveillance Test Coordinator
*J. Carroll	General Supervisor, Operations
*R. Heibel	Principal Engineer, Technical Support
J. Lohr	Operations Surveillance Test Coordinator
*A. Miranda	Engineer, Technical Support
*J. Moreira	General Supervisor, E&C Engineering
L. Russell	Plant Superintendent
*R. Sydnor	E&C Supervisor

USNRC

*D. Trimble Resident Inspector

The inspector also interviewed other licensee personnel including quality assurance and quality control personnel.

* denotes those present at exit interview

2. Auxiliary Feedwater System (AFW) TMI Modifications

2.1 References

- ANSI N18.7 - 1976, Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants.
- Calvert Cliffs Instruction (CCI) - 126E, Administrative Control of Facility Change Request
- CCI - 132E, Requirements for Preparation and Use of Technical Support Plant Engineering Procedures
- NUREG 0737, TMI Action Plan, II.E.1.2, Auxiliary Feedwater System Automatic Initiation and Flow Indication
- NRC Inspection Reports:
 - 317/80-16, 81-02, 81-04
 - 317/81-21, 318/81-20
 - 317/82-27, 318/82-23

- 317/82-30, 318/82-27
- 317,318/83-02, 83-05, 83-07, 83-26, 83-27, 83-31

2.2 Scope

NUREG-0737, Item II.E.1.2, required licensees to upgrade their auxiliary feedwater (AFW) systems by establishing automatic initiation and indication of auxiliary feedwater water flow to each steam generator. Such installations were to be safety grade, and have redundant and emergency electrical power. In addition to the above modification, Calvert Cliffs installed one motor driven AFW pump for each unit to supplement the existing two steam driven AFW pumps per unit. Unit 2 AFW pump modifications were completed November, 1982; and Unit 1 AFW pump modifications were completed November, 1983. As of November, 1983, the licensee has considered AFW for both units to be fully operational and to meet the requirements of NUREG-0737.

Several previous NRC inspections (as listed in paragraph 2.1 above) have, in part, reviewed various aspects of the AFW modifications and past modification testing. Specifically, NRC Inspection Report 317, 318/82-23 stated the following:

"10. Licensee Action on NUREG 0660, NRC Action Plan Developed as a Result of the TMI-2 Accident

The NRC's Region I Office has inspection responsibility for selected action plan items. These items have been broken down into numbered descriptions (enclosure 1 to NUREG 0737, Clarification of TMI Action Plan Items). Licensee letters containing commitments to the NRC were used as the basis for acceptability, along with NRC clarification letters and inspector judgement. The following items were reviewed.

II.E.1.1(2) Auxiliary Feedwater Systems - Long Term System Modifications and II.E.1.2(1.b.2) Auxiliary Feedwater System Automatic Initiation Implementations. The inspector reviewed FCR 79-1062, Revision 2, dated July 7, 1982, Auxiliary Feedwater Modifications and verified that these modifications adequately address the requirements of NUREG 0737 item II.E.1.2 and, upon completion, will satisfy the requirements on II.E.1.2.(b.2). The inspector performed a physical walkdown of the entire Auxiliary Feedwater System on Unit 2, including the five separate modifications contained in FCR 79-1062 to verify current status.

Based on direct observation and review of FCR 79-1062 and P&ID, Auxiliary Feedwater System Unit 2, Revision OG, dated October 19, 1982, the system is approximately 85 to 90% complete. The Licensee's schedule is to complete the Unit 2 modifications by the end of the November 1982 outage. Unit 1 modifications are scheduled to be performed and completed during the November 1983

outage. These items remain open pending completion of the modifications and will be examined during subsequent inspections."

This inspection (84-16) verified that AFW modifications have been installed; post modification testing has been satisfactorily completed; critical drawings have been revised; and appropriate plant procedures have been updated to reflect the AFW Modifications. Based on the results of this inspection as detailed below, Region I verification of NUREG-0737, Item II.E.1.2, can be considered completed and this item closed.

During the course of testing, it was found that the motor driven AFW pumps may cavitate excessively or runout when in automatic flow control at low steam generator pressures in event of a main steam line break. The licensee is currently evaluating this problem, and has AFW flow controllers set in manual (although AFW pumps still have automatic initiation). Resolution to this issue is currently being followed by the Resident Inspector and is considered a separate issue from overall acceptability of the AFW system to the requirements of NUREG-0737.

2.3 AFW Installation Verification

The inspector accompanied by a licensee representative toured the Control Room, Switchgear Rooms, and Turbine Building for Units 1 and 2 and physically verified the following:

- Units 1 and 2 motor driven AFW pumps were installed;
- Control Room panels reflected motor driven AFW pumps, and automatic initiation and flow control features;
- Control Room Alarm Response Panels were modified to reflect new AFW System alarms;
- New AFW logic panels and switchgear had been installed; and,
- New Alternate Safe Shutdown panels were installed which reflected upgraded AFW System installation.

2.4 Post Modification Test Procedure Review

Technical Support Engineering performed initial post-modification testing. Systems were then accepted and turned over to the plant. System operability was confirmed by performing Technical Specification surveillance testing prior to placing the systems in operational service. The inspector reviewed all completed post-modification tests except for flushes and hydrostatic tests and Unit 2 AFW surveillance tests performed immediately after AFW system turnover. All tests which were reviewed are listed in Attachment 1 of this report and were inspected for the following:

- Test data (reviewed on a sampling basis) was complete and within specification;

- Technical Specification Criteria were met;
- NUREG-0737 criteria were met;
- Licensee calculations were correct (independent verification);
- Pump head and flow data conformed to vendor pump curves;
- Test procedures were properly approved;
- Completed tests received appropriate independent reviews;
- Procedure formats, preparation, changes, and performance were in conformance with ANSI N 18.7, CCI-126, and CCI-132.

2.5 Plant Operating Procedures

The inspector reviewed general operating procedures (OP's), system operating instructions (OI's), emergency operating procedures (EOP's); abnormal operating procedures (AOP's) and alarm response procedures as identified in Attachment 2 of this report. Procedures identified in Attachment 2 (except alarm response procedures) were reviewed for the following:

- Procedures were revised to reflect AFW modifications;
- Procedures were consistent with each other; and,
- Procedures, where applicable, conformed to Technical Specifications.

2.6 Plant Drawings

The licensee is still in the process of revising drawings as a result of the AFW modifications. However, critical drawings had been identified and revised for plant operator use immediately after completion of modifications. The inspector reviewed a sampling of drawings (including the AFW System) located in the Control Room which had been identified by the licensee as critical and determined that these drawings had been appropriately revised to reflect AFW modifications.

2.7 Findings

- 10 CFR 50 Appendix B, Criterion V requires that activities affecting quality be prescribed in procedures and that such procedures ensure that important activities be accomplished. During the review of test procedures, the inspector observed that several unresolved items had been identified. A licensee representative stated that some of the items had been resolved while others were added to a "punch" list for the AFW modification. The inspector reviewed a punch list for the AFW Modification dated February 24, 1984, which described items to be resolved, assigned a responsible group or individual for each item, and established an expected completion date. However, the punch list did not provide a means for documenting completion of each punch list item.

Based on discussions with licensee representatives and review of CCI-126, the inspector determined that there were no licensee procedures for the establishment, control, and use of punch lists

for safety related post-modification activities. The inspector informed the licensee that procedures should be established to define control of punch lists for all safety related modifications. These procedures should provide a means for documenting satisfactory accomplishment of punch list items, define responsibilities for control of the list, and define the types of items to be included on the list (such as incomplete maintenance requests, incomplete tests, test exceptions, etc.).

The failure to document satisfactory accomplishment of punch list items and the failure to establish procedures for the control of punch lists for safety related modifications is contrary to 10 CFR 50, Appendix B, Criterion V and is considered a violation (317,318/84-16-01).

- CCI-126 provides a system for ensuring that plant documents and plant training are updated as a result of plant modifications. This is to be documented on a form specified by the procedure and circulated to appropriate plant departments. Although the inspector did not observe any instance where procedure had not been updated, he observed that for several plant organizations, documentation forms dating back to December, 1982, had not been returned. A licensee representative stated that the basic work requested by the forms had been done, but that certain open items were preventing their return. The inspector noted that the system was not working properly if documentation of procedure updates could not be provided in a timely manner.

A licensee representative stated that they were aware of this problem and were taking corrective actions to improve the system. Further, the licensee provided to the inspector documentation that the Institute of Nuclear Power Operations (INPO) had identified a similar finding in a recent inspection. The licensee's response to INPO stated corrective action would be completed by December, 1984. The inspector had no further questions at this time.

- TSP 113, "AFW Pump #13 Pre-Service Testing and 48-Hour Run Test" was performed on June 23, 1983. The test appeared to have been satisfactorily completed, but there was no documentation on the cover sheet of review and approval of the test results. A licensee representative stated that the data had been reviewed but the test had not been closed out because the licensee had intended to reperform the test based on some problems which had occurred subsequent to satisfactory performance of the test.

The inspector informed the licensee that test result review and approval must be documented and the test should not have been held open. The licensee concurred and stated the test would be closed. This appeared to be an isolated instance.

In a phone conversation subsequent to the inspection (see paragraph 4), a licensee representative stated the test results had been formally approved and the test signed off.

- When the inspector expressed a desire to review certain surveillance test procedures (STP's) located in the Control Room, a licensee representative stated that STP's maintained in the Control Rcom were not controlled copies but were marked for information only. He further stated these copies were used for training only and that controlled copies used for actual test performance were maintained at another location.

The inspector expressed a concern that, although not used for test performance, STP's may inadvertently be used for making judgements concerning plant operations and should be controlled to ensure that they are the latest revisions. A licensee representative agreed to evaluate the merits of making STP's located in the Control Room controlled copies. The inspector had no further questions at this time.

3. QA/QC Interfaces

3.1 Quality Control (QC)

The licensee has a large QC staff which has significant involvement in plant maintenance and testing. The inspector noted that there were QC hold and notification points in most of the Technical Support test procedures (TSP's) reviewed. For TSP's written in 1983, there was a requirement for QC notification prior to the start of a test. The inspector randomly sampled seven QC "call" numbers in four tests. The licensee was able to provide to the inspector documentation and details of the inspections performed.

In addition to the above, TSP cover sheets require a QC review and signoff during the procedure approval cycle. QC review of TSP changes is required if a QC hold point is changed.

3.2 Quality Assurance (QA)

A site QA representative stated that there was little formal QA involvement in the modification process. He further stated that because the large scope of the AFW modification (FCR-1062), QA personnel informally participated in planning meetings, but that such participation was not required and was not documented.

QA produced for the inspector two audits in which FCR-1062 was one of several modifications which were sampled. Only the construction phase of FCR-1062 was audited. These audits were:

- QAP-15, Changes, Tests and Experiments (Modifications). Audit No.

- 15-28-82, performed September - October, 1982; and, QAP-15, Modifications, Audit No. 15-24-83, performed July - August, 1983.

The inspector observed that only minor discrepancies were identified during these audits concerning FCR-1062.

4. Management Meetings

Licensee management was informed of the scope and purpose of the inspection at an entrance interview conducted on June 4, 1984. The findings of the inspection were periodically discussed with licensee representatives during the course of the inspection. An exit interview was conducted on June 8, 1984 (see paragraph 1 for attendees) at which time the findings of the inspection were presented.

At no time during this inspection was written material provided to the licensee by the inspector.

A subsequent telephone discussion concerning the inspection findings was conducted between the inspector and Mr. N. Blumberg and Mr. J. Carroll on June 18, 1984.

ATTACHMENT I

AUXILIARY FEEDWATER SYSTEM POST
MODIFICATION TESTS REVIEWED

Note: All tests listed below were completed tests. Data review was on a sampling basis.

A. Unit 1

(1) Technical Support Engineering Post Modification tests:

- TSP-117, Auxiliary Feedwater System Logic Test (Unit 1), Revision 0, May 4, 1983. Test completed June 29, 1983.
- TSP-119, Auxiliary Feedwater Modification - FCR 79-1062 Cold Preoperational Test Procedures - Part I, Revision 0, September 15, 1983. Test completed November 29, 1983.
- TSP-120, Auxiliary Feedwater Modification FCR 79-1062 Cold Preoperational Test Procedure - Part II, Revision 0, October 19, 1983. Test completed, November 29, 1983.
- TSP-121, AFAS Time Response Test, Revision 0, October 17, 1983. Test completed December 12, 1983.
- TSP-122, Auxiliary Feedwater Modification FCR 79-1062 Hot Preoperational Test Procedure, Revision 0, October 17, 1983. Test completed December 20, 1983.
- TSP-149, Flow Verification From U-2 Third Train Auxiliary Feedwater System to Steam Generators #11 and #12 via the Cross Connect Line, Revision 0, October 21, 1983. Test completed December 20, 1983.
- TSP-113, AFW Pump #13 Preservice Testing and 48 Hour Run Test, Revision 0, June 15, 1983. Test completed June 23, 1983.
- TSP-141, Flow Verification From U-1 Third Train Auxiliary Feedwater System to Steam Generators #21 and #22 Via the Cross Connect Line, Revision 0, September 1983. Test completed September 18, 1983.
- TSP-142, Unit 1 Third Train Auxiliary Feedwater System Durability Test Under Post Accident Pressure Assumed for MSLB Accident, Revision 0, October 17, 1983. Test completed November 28, 1983.

(2) Operational Surveillance Tests:

- O-4-1, Integrated Engineered Safety feature Test, Revision 10, November 18, 1983. Test completed November 26, 1983.

- 0-5-1, Auxiliary Feedwater System, Revision 23, November 27, 1983. Test completed November 29, 1983.
- 0-9-1, Auxiliary Feedwater Actuation System Monthly Logic Test, Revision 0, November 27, 1983. Test completed November 29, 1983.
- 0-62-1, Monthly Valve Position Verification, Revision 16, November 18, 1983. Test completed November 30, 1983.
- 0-63-1, Remote Shutdown Instrument Channel Check, Revision 11, November 18, 1983. Test performed November 29, 1983.
- 0-66-1, Quarterly Valve Operability - Shutdown, Revision 12, 1983. Test completed November 28, 1983.
- 0-67-1, Check Valve Operability Verification, Revision 12, November 4, 1983. Test completed November 29, 1983.
- 0-68-1, Refueling Cycle Valve - Position Indicator Test, Revision 5, November 18, 1983. Test completed November 28, 1983.
- 0-74-1, ESF Equipment Inservice Bearing Temperature Test, Revision 10, November 2, 1983. Test completed November 25, 1983.
- 0-93-1, Locked Valve Verification Outside Containment, Revision 13, November 18, 1983. Test completed November 25, 1983.

(3) E&C Surveillance Tests:

- M-210A-1, RPS Functional Test, Revision 16, November 17, 1983. Test completed November 25, 1983.
- M-210B-1, Reactor Protection System Functional Test, Revision 21, December 16, 1983. Test completed December 31, 1983.
- M-225-1, Auxiliary Feedwater Actuation System Functional Test, Revision 0, September 15, 1983. Test completed December 14, 1983.
- M-510-1, RPS Calibration Check Revision 10, September 28, 1983. Test completed November 17, 1983.
- M-525-1, Auxiliary Feedwater System Calibration, Revision 0, September 15, 1983. Test completed November 25, 1983.
- M-526-1, Auxiliary Feedwater Actuation System Response Time Test, Revision 0, September 28, 1983. Test completed November 15, 1983.

B. Unit 2

(1) Technical Support Engineering Post Modification Tests:

- TSP-86, Auxiliary Feedwater Actuation System Logic Test, Revision 0, September 22, 1982, test completed October 11, 1982.
 - TSP-91, Auxiliary Feedwater Modification - FCR 79-1062 Cold Preoperational Test Procedure - Part I, Revision 0, November 26, 1982. Test completed February 8, 1983.
 - TSP-99, Auxiliary Feedwater Modification FCR 79-1062 Cold Preoperational Test Procedure - Part II, Revision 0, December 13, 1982. Test completed January 20, 1983.
 - TSP-97, AFAS Time Response Test, Revision 0, November 26, 1982. Test completed January 21, 1983.
 - TSP-101, Auxiliary Feedwater Modification FCR 79-1062 Hot Preoperational Test, Revision 0, January 7, 1983. Test completed January 21, 1983.
 - TSP-95, AFW Pump #23 Preservice Testing and 48 Hour Run Test, Revision 0, November 26, 1982. Test completed December 17, 1982.
 - TSP-165, AFW Motor Driven Pump Testing, Revision 0, April 11, 1984. Test completed April 21, 1984. (This test provided additional testing of pump flow control during low steam generator pressure conditions).
- (2) Post Modification Operations and E&C Surveillance tests for Unit 2 were not reviewed.

ATTACHMENT 2

PLANT PROCEDURES - PROCEDURES WHICH WERE REVISED AS A RESULT OF
AUXILIARY FEEDWATER PUMP MODIFICATIONS

Notes:

(1) Plant surveillance tests which were revised are listed in Attachment 1.

(2) Procedures listed below apply to Unit 1 and Unit 2.

(1) Operating Procedures:

- OP-6, Prestartup Checkoff

(2) Operating Instructions:

- OI-12B, Steam Generator System
- OI-19, Instrument Air
- OI-26A, 125 Volt Vital DC
- OI-26B, 125 Volt Vital AC and Computer DC
- OI-27C, 4.16 Kv System
- OI-32, Auxiliary Feedwater System

(3) Emergency Operating Procedures:

- EOP-1, Reactor Trip
- EOP-3, Loss of Main Feedwater
- EOP-4, Steam Line Rupture
- EOP-5, Loss of Reactor Coolant
- EOP-8, Control Room Evacuation
- EOP-12, Loss of Reactor Coolant Flow/ Natural Circulation
- EOP-14, Loss of Instrument Air
- EOP-15, Loss of A/C Power

(4) Abnormal Operating Procedures

- AOP-14, Reactor Trip Recovery
- AOP-15, Loss of Auxiliary Feedwater
- AOP-16, Loss of Power to Class 1E and Non-Class 1E Buses

(5) Alarm Response Procedures

Alarm response procedures were verified, on a sampling basis, as having been established; however, alarm response procedures were not reviewed.