

U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Docket/Report: 50-317/86-20
50-318/86-20

License: DPR-53
DPR-69

Licensee: Baltimore Gas and Electric Company

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

Inspection At: Lusby, Maryland

Inspection Conducted: November 3-7, 1986

Inspectors: S. A. McNeil, Project Manager, PBD-8, NRR
R. M. Perfetti, Project Engineer, PBD-8, NRR

Approved: J. E. Tripp
W. E. Tripp, Chief, Reactor Projects Section 3A

11/24/86
Date

Inspection Summary: November 3-7, 1986 (Report Nos. 50-317/86-20; 50-317/86-20)

Areas Inspected: Special, announced on-site inspection in the areas of plant operations and surveillance programs for (1) containment integrity verification, (2) containment isolation valves and air locks, (3) hydrogen control system, (4) containment spray system, (5) containment cooling system, (6) iodine removal system, and (7) penetration room exhaust air filtration system. Inspection hours totalled 94.

Results: One violation concerning the licensee's failure to properly review completed surveillance tests (Detail 4) and two unresolved items were identified: (1) closure of containment penetration during core alterations and irradiated fuel movements (Detail 3.a), and (2) verification that every containment spray system nozzle is unobstructed (Detail 4.b).

1. Persons Contacted

Baltimore Gas and Electric Company

- *R. R. Allen, Principal Engineer, Performance Engineering, NESD
- *A. B. Anuje, Principal Engineer, Quality Audits, QASD
- *M. E. Bowman, General Supervisor, Technical Services, NESD
- *J. E. Branyon, Operations Surveillance Coordinator, NESD
- O. P. Bulich, Secondary Systems Engineer, NESD
- J. Carrol, General Supervisor, QASD
- *R. M. Douglas, Manager, QASD
- M. Finley, Engineer, Licensing, NESD
- *R. P. Heibel, General Supervisor Operations, NOD
- R. Holt, Procedure Development, NOD
- *M. S. Kostelnik, Engineer, Primary Systems Engineering, NESD
- *L. Larragoite, Engineer, Licensing, NESD
- *J. R. Lemmons, Manager, NOD
- *W. J. Lippold, Manager, NESD
- J. Lohr, Principal Engineer, Procedure Development, NOD
- *C. R. Mahon, Principal Engineer, Primary Systems Engineering, NESD
- *J. M. Moreira, General Supervisor E&C, NMD
- M. Polak, Engineer, Primary Systems Engineering, NESD
- *L. B. Russell, Manager, NMD
- *L. E. Salyards, Principal Engineer, Licensing, NESD
- *R. B. Sydnor, Senior Engineer, Primary Systems Engineering, NESD
- *A. R. Thornton, General Supervisor Plant and Project Engineering, NESD
- T. J. Unkle, Engineer, Management Systems, QASD
- M. J. Warren, Engineering Surveillance Test Coordinator, NESD
- M. L. Wasem, Procedure Development, NOD

NRC

*T. Foley, Senior Resident Inspector

*Present at Exit Interview on November 7, 1986.

2. Review of Plant Operations

a. Operational Safety Verification

The control room was inspected periodically to verify compliance with minimum staffing requirements, access control, adherence to approved procedures, and compliance with limiting conditions for operation (LCO).

b. Station Tours

The inspectors toured accessible areas of the plant including the control room, Unit 1 containment structure, Unit 1 cryogenics room and the turbine building. During these tours, observations were made relative to the equipment condition, fire and safety hazards, housekeeping, and

radiological controls and conditions. No significant concerns were identified in these areas. Housekeeping was generally good for a re-fueling outage.

c. System Walkdown

A walkdown of the Unit 1 Containment Iodine Removal System and Hydrogen Control System was conducted to observe equipment conditions and valve positions.

The inspector noted the following discrepancies with the system lineup OI-41B, Hydrogen Purge System Operation - (Unit 1) Attachment (1A): (1) a vent valve was omitted from the valve lineup and (2) the location of a test valve described in the lineup was erroneous.

The licensee was informed and took immediate action to correct the noted discrepancies.

3. Surveillance Activities

The inspectors performed an indepth review of the licensee's Technical Specification (TS) surveillance programs for (1) containment integrity verification, (2) containment isolation valves and air locks, (3) hydrogen control system, (4) containment spray system, (5) containment cooling system, (6) iodine removal system, and (7) penetration room exhaust air filtration system. The surveillance records reviewed are noted in Attachment A. The inspectors reviewed the past 6-12 months of records for surveillances that have a performance frequency of quarterly or greater. Additionally, the inspectors examined the records of the previous two performances of each surveillance that is conducted less frequently than every quarter.

The inspectors noted that the operations surveillance procedures generally were adequately written and performed. In some cases, notably containment integrity verification, these surveillance tests were significantly more conservative than the TS requirements. Conversely, some maintenance surveillance procedures (i.e., instrument calibrations and leak rate tests) were incomplete; some step-by-step procedures did not contain provisions for recording test values required to be measured during intermediate steps of the surveillance, and the results of these measurements were not recorded.

The following concerns were noted during this surveillance review:

- a. During core alterations or the movement of irradiated fuel within the containment, TS LCO 3.9.4.c for Units 1 and 2 requires that each penetration providing direct access from the containment atmosphere to the outside atmosphere shall be either closed by an isolation valve, blind flange, or manual valve, or be capable of being closed by an operable automatic containment purge valve. TS Surveillance Requirement 4.9.4.a specifies these penetrations to be checked closed at least once per 7 days while in the applicable plant conditions. Section 14.18.3 of the

Updated Final Safety Analysis Report (UFSAR) states that during refueling, the containment would be sealed for an inside containment fuel handling incident except that it might be open to a penetration room which is being exhausted to the plant vent through the charcoal filters. Additionally, Section 14.18.1 of the UFSAR states that the only route for the release of activity to the environment would be the air drawn across the spent fuel pool area and discharged to the atmosphere through the plant vent.

Contrary to the above, as the containment penetration room is not ventilated or under negative pressure during these conditions nor is the containment penetration room exhaust system required to be operable or demonstrated operable in mode 6, the following penetrations into the containment penetration room apparently present direct access from the containment atmosphere to the outside atmosphere, through the penetration room, but are not verified to be closed as required by TS Surveillance Requirement 4.9.4.a:

<u>Penetration No.</u>	<u>Service</u>
1D	Postaccident Sample
11,12	Containment Structure Sump Recirc Line
47A,B,C,	Hydrogen Sampling
47D	Hydrogen Sampling Return
49A,B,C,	Hydrogen Sampling
60	Steam to Reactor Head Washdown Area

The licensee has committed to (1) resolution of this item prior to the commencement of the Unit 2, Spring 1987 refueling outage and (2) verifying these penetrations to be closed at least once every 7 days during the current Unit 1 refueling outage.

The apparent failure to verify the closure of these containment penetrations during core alterations and irradiated fuel movements shall remain unresolved pending followup (50-317/86-20-01; 50-318/86-20-01).

- b. Unit 1 TS Surveillance Requirement 4.6.2.1.c requires that the containment spray system be demonstrated operable for continued mode 1, 2 or 3 operation by performing an air or smoke flow test through each spray header at least once per 5 years and verifying that each spray nozzle is unobstructed.

The last performance of the surveillance test procedure, STP M-14-1, "Spray Nozzle Test," completed on November 20, 1983, verified the operability of 90 spray nozzles on the inner containment spray ring and 89 nozzles on the outer containment spray ring.

Contrary to the above, the actual spray nozzle configuration of the Unit 1 containment spray system is 89 spray nozzles on the inner spray ring and 90 spray nozzles on the outer spray ring. The last test conducted

that verified the proper number of spray nozzles for each spray header was STP M-620-1, "Spray Nozzle Test," completed on May 2, 1979. The maximum interval permitted by TS 4.0.2.a required this surveillance be completed by August 2, 1985 (i.e., within 6.25 years from the previous date of completion). Subsequently, Unit 1 has operated in mode 1 from August 1985 until October 1986. Therefore, the licensee apparently failed to demonstrate Unit 1 containment spray system operability for continued mode 1 operation by not verifying that each spray header nozzle was unobstructed as required by TS.

The licensee has committed to resolving this issue (inconsistency) prior to Unit 1 entering mode 3 following the current refueling outage.

The apparent failure to demonstrate the operability of the Unit 1 containment spray system by verifying that every spray nozzle in each spray header is unobstructed shall remain unresolved pending followup (50-317/86-20-02).

- c. TS Surveillance Requirement 4.6.4.1.4 requires that the containment purge isolation valves be demonstrated operable any time after being opened and prior to entering mode 4 from shutdown modes by verifying that when the measured leakage rate is added to the combined Type B and C leakage rate, the combined leakage rate is ≤ 0.60 La (207,600 SCCM). Step 15 of STP M-671-1(2) "Containment Purge Isolation Valve Leak Rate Test" for Units 1 and 2 requires the "as left" leak rate be recorded on the current leak rate sheet in STP M-571-1(2), "Local Leak Rate Test," and that the total type B and C leakage be recalculated.

Contrary to the above, the inspectors' review of the five Unit 1 surveillances (M-671-1) performed since June 1985 and the three Unit 2 surveillances (M-671-2) conducted since December 1985 found that the measured containment purge isolation valve leakage rates were not recorded nor was the total combined type B and C leakage recalculated on the current applicable leak rate sheet in STP M-571-1(2). The licensee was maintaining an unofficial, unreviewed total type B and C leakage computation for each unit on a sheet of scrap paper. This indicated that though the licensee was not maintaining the required quality assurance records nor following procedure, the combined leakage rate was apparently verified to be ≤ 0.60 La when required.

The licensee immediately implemented corrective action and by the conclusion of the inspection had completed a draft revision of STPs M-571-1(2) and M-671-1(2) to ensure the proper performance and recording of this surveillance requirement. Additionally, the licensee has committed to issuing the final, formal procedural revisions to these procedures by December 7, 1986. This will receive inspector followup in subsequent inspection(s).

- d. TS 4.6.4.1.2.c requires that each isolation valve specified in Table 3.6-1 be demonstrated operable during modes 5 or 6 at least once per 18 months by verifying that upon receipt of the appropriate actuation channel test signals, each required isolation valve actuates to its isolation position. The purge air inlet valves (CPA-1410-CV and CPA-1411-CV) and the purge air outlet valves (CAP-1412-CV and CPA-1413-CV) are specified in Table 3.6-1 as being required to be verified to close upon receipt of the applicable safety injection actuation test signals.

The licensee procedures to demonstrate isolation valve operability through instituting test signals on the appropriate actuation channels (safety injection actuation, containment radiation high and containment isolation) are STPs 0-4-1(2), "Integrated Engineered Safety Features Test" and STPs 0-7-1(2), "Engineering Safety Features Logic Test." An inspector review of these Unit 1 and 2 surveillances performed in 1985 and 1986 indicated that contrary to the above, the safety injection actuation of the purge inlet and outlet valves was not being tested. As the purge valves are required to be locked shut during modes 1 through 4 and the safety injection function is applicable only for modes 1 through 4, no violation was cited.

The licensee has committed to taking appropriate corrective action for the purge valve safety injection actuation surveillance requirements for both Units 1 and 2 prior to Unit 1 entering mode 4 following the current refueling outage. This item will receive inspector followup in subsequent inspection(s).

- e. Appendix 104.70 of CCI 104H, "Surveillance Test Program," dated June 1, 1986, provides a cross reference list of the licensee's master surveillance test procedures and of the TS surveillance requirements that they satisfy. A review of this appendix found the cross reference list to be incomplete as in some instances, the appropriate TS requirements were not cross referenced to the proper STPs, either being omitted or improperly referenced. For example, STP 0-1 is improperly referenced to TS 4.6.4.1.2.a whereas TS 4.6.1.1.b&c, 4.6.1.8, 4.6.4.1.2.c, 4.6.4.1.3, and 4.6.5.1 surveillance requirements are not cross referenced to any STPs. Licensee actions will receive inspector followup in a subsequent inspection.

4. Completed Surveillance Test Reviews

TS 6.8, "Procedures," states that written procedures shall be established, implemented and maintained covering surveillance and test activities of safety related equipment.

Calvert Cliffs Instruction CCI 104H, "Surveillance Test Program," and Quality Assurance Procedure QAP 16, "Surveillance Testing," require upon completion of a surveillance test the reviewers (1) verify that the procedure has been properly completed and that failures or deviations from acceptance criteria have been recorded; (2) direct the appropriate corrective action to be taken

and note such action on the completed surveillance test procedure cover sheet. Additionally, these procedures state that a test procedure is not complete until all conditions of the test procedure are satisfied.

The inspector found that the following completed surveillance tests had not been properly reviewed and that the necessary corrective actions had not been taken for the improper completion and/or failure of the acceptance criteria:

<u>STPs</u>	<u>Dates Performed</u>
M-380B-0, "H ₂ Analyzer Calibration 0-AE-6527"	December 16, 1985 June 24, 1986
0-28-1, "Hydrogen Recombiner Semi-Annual Test"	September 18, 1986
0-65-2, "Quarterly Valve Operability Verification-Operating"	October 11, 1986

- a. Calvert Cliffs has two hydrogen analyzers which are common to both Units 1 and 2. These hydrogen analyzers must be calibrated at least once every 92 days in accordance with TS surveillance Requirement 4.6.5.2 to demonstrate their operability. Both hydrogen analyzers are required to be operable by TS LCO 3.6.5.1 to permit continued mode 1 or 2 operation. For both the December 16, 1985 and June 24, 1986 performance of STP M-380B-0, the applicable hydrogen analyzer did not meet the calibration acceptance criteria in that the hydrogen concentration meters were out of their specified indicating bands by approximately 0.1-0.2% hydrogen in the non-conservative direction. For neither of these tests did the technician, shift supervisor or the surveillance test coordinator recognize that the test results were out of specification. As a result, no corrective actions were taken so both Units 1 and 2 continued 3 months of mode 1 operation following each performance of these STPs with one hydrogen analyzer not meeting the calibration acceptance criteria.
- b. T.S. Surveillance Requirement 4.6.5.2.a states that each hydrogen recombiner shall be demonstrated operable at least once per 6 months by verifying during a system functional test that the minimum heater sheath temperature increases to $\geq 700^{\circ}\text{F}$ within 90 minutes and is maintained for at least two hours. STP 0-28-1 was performed on September 18, 1986 to satisfy this requirement for both No. 11 and 12 Unit 1 hydrogen recombiners. Contrary to the test criteria, both recombiners were operated for only 1 hour and 45 minutes at 700°F rather than the two hours required.

This failure to meet the test acceptance criteria was not noted during the performance or review processes.

As this surveillance had been performed previously on March 18, 1986 and Unit 1 was shutdown on October 24, 1986, neither the maximum allowable surveillance interval of TS 4.0.2.a nor the maximum combined surveillance interval of TS 4.0.2.b were exceeded since the March 1986 performance of the surveillance.

- c. STP 0-65-2 is performed quarterly to verify that the isolation times of the containment isolation valves for Unit 2 are within the limits specified by TS 4.6.4.1.3 when tested pursuant to TS 4.0.5. When performed in October 1986, the test was signed as complete on October 7, 1986. Yet, portions of the test were not performed until October 9 and 11, 1986. CCI 104H states that a test procedure is not complete until all conditions of the test procedure are satisfied. Neither the technician nor the reviewers noted this test discrepancy.

The failure to properly review completed surveillances and take corrective action for out of specification test results and/or for improper test completion constitutes a violation (50-317/86-20-03; 50-318/86-20-02).

5. UFSAR Discrepancies

Table 5-3, "Containment Structure Isolation Valve Information," and Figure 5-10, "Containment Structure Isolation Valve Arrangements," of the UFSAR are stated to provide the different containment structure isolation valve arrangements for each Unit 1 and 2 containment penetration. A review of Table 5-3 and Figure 5-10 indicates that there are apparently numerous discrepancies between this UFSAR information and the actual containment isolation valve arrangements. Of the 73 penetrations provided in Table 5-3, "Containment Structure Isolation Valve Information," 28 of these penetrations have valves listed as part of the penetration which are not treated as containment isolation valves for the licensee's TS surveillance requirements. Likewise, the valve arrangements of 21 of the 73 penetrations provided in Figure 5-10, "Containment Structure Isolation Valve Arrangements," do not reflect the actual penetration valve arrangements in that in each of these 21, actual containment isolation valves are apparently missing from the arrangements provided in the UFSAR.

The licensee requested that the inspectors provide a written list of apparent UFSAR deficiencies that were identified. A copy of the list provided to the licensee is provided in Attachment B. The inspector will review licensee followup actions in subsequent inspection(s).

6. Unresolved Items:

An unresolved item is a matter about which more information is required to determine whether it is an acceptable item, a deviation, or a violation. The following items shall remain unresolved pending followup:

- Unresolved Item 50-317/86-20-01; 50-318/86-20-01. The failure to verify the closure of all containment penetrations apparently providing direct access from the containment atmosphere to the outside atmosphere during core alterations or the movement of irradiated fuel (Item 3.a).
- Unresolved Item 50-317/86-20-02. The failure to verify by performance of an air or smoke flow test that each spray nozzle in the Unit 1 containment spray system is unobstructed (Item 3.b).

7. Exit Interview

The findings of this inspection were discussed with the persons designated in Paragraph 1 on November 7, 1986.

8. Attachments

- A. Surveillance Test Procedures Reviewed
- B. UFSAR Discrepancies Noted

ATTACHMENT A

SURVEILLANCE TEST PROCEDURES REVIEWED

Unit 1

0-4-1 "Integrated Engineered Safety Features Test," Revision 11
0-7-1 "Engineering Safety Features Logic Test," Revision 37
0-28-1 "Hydrogen Recombiner Semi-Annual Test," Revision 3
0-55-1 "Containment Integrity Verification," Revision 28
0-55-A-1 "Containment Integrity Verification (Mode 6)," Revision 11
0-58-1 "Hydrogen Recombiner 18 Month Test," Revision 2
0-60-1 "Containment Purge System Isolation Test," Revision 5
0-62-1 "Monthly Valve Position Verification," Revision 25
0-66-1 "Quarterly Valve Operability Verification-Shutdown," Revision 17
0-70-1 "Staggered Test of "A" Train Components," Revision 6
0-71-1 "Staggered Test of "B" Train Components," Revision 7
0-93-1 "Locked Valve Verification," Revision 20
0-95-1 "Locked Valve Verification Inside Containment," Revision 3
M-14-1 "Spray Nozzle Test," Revision 0
M-171-1 "Personnel Air Lock Seal Test," Revision 6
M-172-1 "Personnel Escape Lock Seal Test," Revision 6
M-471-1 "Air Lock Door Operability & Local Leak Rate Test," Revision 6
M-544-1 "Penetration Room Exhaust Filter Test (HEPA)," Revision 4
M-545-1 "Penetration Room Exhaust Filter Test (Charcoal)," Revision 4
M-548-1 "Containment Iodine Removal Filter Test (HEPA)," Revision 3
M-549-1 "Containment Iodine Removal Filter Test (Charcoal)," Revision 4
M-571-1 "Local Leak Rate Test," Revision 6
M-580-1 "H₂ Recombiner Control Calibration," Revision 4
M-581-1 "Electric Hydrogen Recombiner Inspection," Revision 3
M-671-1 "Containment Purge Isolation Valves Leak Rate Test," Revision 1

Unit 2

0-4-2 "Integrated Engineered Safety Features Test," Revision 13
0-7-2 "Engineering Safety Features Logic Test," Revision 37
0-28-2 "Hydrogen Recombiner Semi-Annual Test," Revision 3
0-55-2 "Containment Integrity Verification," Revision 30
0-55-A-2 "Containment Integrity Verification (Mode 6)," Revision 9
0-58-2 "Hydrogen Recombiner 18 Month Test," Revision 2
0-60-2 "Containment Purge System Isolation Test," Revision 3
0-62-2 "Monthly Valve Position Verification," Revision 23
0-65-2 "Quarterly Valve Operability Verification-Operating," Revision 30
0-66-2 "Quarterly Valve Operability Verification-Shutdown," Revision 23
M-22-2 "Containment Purge Valve Seal Replacement," Revision 0
M-171-2 "Personnel Air Lock Seal Test," Revision 7
M-172-2 "Personnel Escape Lock Seal Test," Revision 8
M-471-2 "Air Lock Door Operability & Local Leak Rate Test," Revision 8
M-571-2 "Local Leak Rate Test," Revision 13
M-580-2 "H₂ Recombiner Control Calibration," Revision 3

M-581-2 "Electric Hydrogen Recombiner Inspection," Revision 4
M-671-2 "Containment Purge Isolation Valves Leak Rate Test," Revision 1

Unit 1 and 2

M-380A-0 "H₂ Analyzer Calibration 0-AE-6519," Revision 9
M-380B-0 "H₂ Analyzer Calibration 0-AE-6527," Revision 9

ATTACHMENT B

UFSAR DISCREPANCIES NOTED

1. Table 5.3 UFSAR

The following penetrations in Table 5.3, "Containment Structure Isolation Valve Information," reflect valves applicable to their penetrations that apparently are not containment isolation valves:

1B, 1D, 2A, 2B, 9, 10, 11, 12, 16, 18, 19A, 19B, 20A, 20B, 20C, 37, 38, 39, 44, 47A, 47B, 47C, 49A, 49B, 49C, 59, 60, and 64

2. Figure 5.10 UFSAR

The valve arrangements of the following penetrations provided in Figure 5.10, "Containment Structure Isolation Valve Arrangements," apparently do not reflect all containment isolation valves actually in the penetration arrangement:

1A, 1B, 1C, 2A, 2B, 10, 11, 12, 13, 14, 16, 18, 23, 39, 41, 60, 64, 72, 77, 78, and 83.