

U.S. NUCLEAR REGULATORY COMMISSION
REGION 1

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LICENSEE: Baltimore Gas and Electric Company
Post Office Box 1475
Baltimore, Maryland 21203

FACILITY NAME: Calvert Cliffs Nuclear Power Plant, Units 1 and 2

INSPECTION AT: Lusby, Maryland

INSPECTION DATES: June 22 - 26, 1992

INSPECTORS: *Harold I. Gugg* 7/27/92
for Astrid E. Lopez-Goldberg, Reactor Date
Engineer, Systems Section, EB, DRS

B. J. McDermott, Reactor Engineer

APPROVED BY: *Harold I. Gugg* 7/29/92
for Dr. P. K. Eapen, Chief, Systems Section, Date
Engineering Branch, DRS

Areas Inspected: Inservice Testing (IST) of pumps and valves, the supporting organization, and documentation.

Results: In the areas sampled, the licensee adequately implemented the IST program with the following minor exceptions: inadequate procedure update for pump vibration recording; an isolated instance of failure to increase the test frequency for valve 1-SRW-1597-CV; and inadequate documentation for the limiting stroke time determination. One Unresolved Item (50-317/318-91-06-01) was closed as discussed in section 2.1.b. A violation was also identified, as discussed in section 4.0, due to inadequate corrective action to resolve multiple failures of valve 2-SW-5173-CV (50-317,318/92-18-01). A missed valve stroke time alert limit was identified and was classified as a non-cited violation as discussed in Paragraph 2.2.a.

1.0 PURPOSE AND SCOPE FOR INSPECTION OF THE INSERVICE TESTING PROGRAM

This inspection was conducted to review and assess the licensee's implementation of their Inservice Testing (IST) program for pumps and valves. Verification of adherence to regulatory requirements and ASME Section XI requirements were addressed as part of the inspection. The inspector used NRC Inspection Manual Procedure 73756, "Inservice Testing of Pumps and Valves," as a guide.

2.0 ADMINISTRATION OF THE IST PROGRAM

The licensee is currently implementing its second 10-year (April 1, 1987, through March 31, 1997) IST program which is described as Revision 1 to the "ASME Section XI Pump and Valve Test Programs - Units 1 and 2." The program document identifies the pump and valve inservice testing that will be performed in accordance with ASME Code Section XI, Subsections IWP and IWV, 1983 Edition through Summer 1983 Addendum. Also identified are the individual pumps and valves to be tested, their frequency of testing, and specific relief requests from the requirements of the ASME Code Section XI.

Calvert Cliffs Instruction (CCI) 104, "Surveillance Test Program," Rev. L/Change 0 provides instructions for implementing the requirements of surveillance testing and identifies the responsibilities of the various managers, supervisors, and engineers. The principal members with respect to IST are the Operations Functional Surveillance Test Coordinator (OFSTC) and the IST Engineer. The OFSTC schedules the surveillance test procedure (STP), monitors test performance to ensure they are completed as scheduled, ensures all applicable surveillance test requirements are addressed, ensures all deviations from the acceptance criteria are submitted to the Plant Operating Station Review Committee (POSRC) for review and the Plant General Manager for approval, and reviews all completed STPs. The IST Engineer is responsible for the overall control of the IST program, reviews all IST STPs for compliance with the ASME Code, and trends the IST parameters.

Between 1988 and 1990, the licensee noted that they were experiencing problems in the area of IST. In 1990 the licensee contracted Enercon Services, Inc. to perform the STP Technical Adequacy Review Project (TARP). The main goal of the project was to increase the quality of STPs, in particular their technical adequacy. This project identified approximately 269 STP technical issues and 6 potential commitments not implemented by STPs reviewed. As a result of these identified concerns, many procedure changes have been implemented. The target date for resolution of the remaining issues is the end of 1992.

1 Inservice Pump Testing

The inspectors reviewed pump performance records for the saltwater, high pressure safety injection, low pressure safety injection, and containment spray systems against ASME Section I requirements for inservice testing of pumps. The inspectors noted that the test procedures were the latest ones approved and the required parameters were recorded, with one exception noted in paragraph 2.1.a, and the data was evaluated within the 96 hour time constraint. The licensee uses these historical records to identify trends and test results that fall in the alert or action ranges. The inspectors did not identify any deviations from the ASME code requirements.

2.1.a Vibration Monitoring

The inspectors reviewed completed surveillance test procedures (STPs) to verify historical record accuracy and to compare the STPs with ASME Article IWP-3000, "Inservice Test Procedures." The licensee submitted a relief request from the annual pump bearing temperature measurement requirements of IWP 3000 for all pumps in the IST program. As compensatory measures the licensee committed to taking pump vibration readings in two orthogonal directions. The NRC reviewed and approved the relief request, as part of the second ten-year IST program, in a safety evaluation report, dated September 20, 1990. The inspectors noted that STP 0-73B-2, "Service Water Pump Performance Test," does not require recording vibration measurements in two orthogonal directions. The IST engineer stated that although some procedures only require one measurement to be recorded, measurements are taken in two directions. Plant personnel are trained to measure the vibration in two directions and record the larger value. The licensee has revised some pump test procedures as part of their Procedure Upgrade Program (PUP). Procedures revised during the latter part of the program included requirements to record the vibration data for the inner and outer bearings in two directions. The procedure identified by the inspector had been through the PUP review before this update on vibration record was applied. The IST engineer opened a tracking system item for this issue and stated that the test procedures that have not had this change will be updated during their next bi-annual review. The inspectors considered this action appropriate since the measurements were actually being taken in two orthogonal directions, as required by the SER.

2.1.b Misapplication Of Flow Instrument Inaccuracies, UNR 50-317,318/91-06-01 (Closed)

The inspectors reviewed the licensee's response to UNR 50-317,318/91-06-01, regarding saltwater system flow measurement during check valve STPs. The licensee uses an ultrasonic flowmeter to measure flow during operability and full stroke testing of saltwater system check valves. Prior to March 1991, the acceptance criteria of 18130 gpm in the STP accounted for the instrument inaccuracy by adding 4% to the UFSAR value of 17,430 gpm. However, the vendor information describes the flow instrument inaccuracy as 3 percent of the indicated reading. This discrepancy in not using a percentage of the indicated flow was thought to be a

problem that could result in a flow less than required in the UFSAR. In March 1991, during the saltwater system STP, the required flow was not met. The licensee changed the instrument inaccuracy to the 3% of indicated value, as listed in the vendor information, and thus was able to justify acceptance of the lower flow value. However, the licensee changed the STP acceptance criteria without realizing that the old acceptance criteria may not have assured the UFSAR required value was met. The NRC has been tracking this issue as an unresolved item pending review of the licensee's assessment of past STP results and other STPs that could be affected.

The licensee reviewed the saltwater pump STP flows for the two previous surveillances. After correcting for instrument error using the appropriate method, the flow rates were greater than 800 gpm above the 17,430 gpm requirement. The licensee also reviewed other STPs using ultrasonic flow meters to identify if similar errors existed. They concluded that the existing acceptance criteria, calculated by adding 4% to the UFSAR values, were more conservative than the 3% of indicated value acceptance criteria. The licensee identified one exception. Using the 3% of indicated error, the miniflow acceptance criteria for containment spray was 0.08 gpm below the UFSAR value of 50 gpm. The licensee increased the acceptance criteria from 52 to 53 gpm to correct this discrepancy. A review of previous STP test data showed that flows were typically 10 gpm above the acceptance criteria; therefore, the licensee considered the safety significance minimal.

The inspectors concluded that the licensee has adequately addressed the concerns associated with this issue. The inspectors considered this item closed.

2.2 Inservice Valve Testing

The inspectors reviewed valve performance records for the cold shutdown valves and the containment cooler service water outlet valve against ASME Section XI requirements for inservice testing of valves. Also reviewed were all of the ASME Section XI Power-Operated Valve Stroke Time Data forms which contained, at the least, the past 3 or 4 test dates, stroke times and whether a post-maintenance test was done. The inspectors identified only one isolated deviation from the ASME code requirements, as noted in paragraph 2.2.a.

2.2.a Missed Alert Classification

During their review of data sheets for IST program power operated-valves, the inspectors noted one discrepancy. On October 25, 1991, air-operated valve 1-SRW-1597-CV stroked shut in 15.7 seconds. Based on the 12.4 second stroke time of the August 3, 1991 STP, the Section XI alert value was 15.5 seconds. When an alert value is exceeded, Section XI requires the valve test frequency be increased to once each month. Typical stroke times for this valve are in the 15 second range. After the inspectors identified the missed alert, the licensee wrote an issue report to initiate corrective actions. An immediate review of the valve historical stroke time data showed that the valve was not degrading and that the 12.49 second stroke time was inconsistent with earlier tests. As part of their corrective actions the

licensee established interim guidance for reviewing ASME Section XI surveillance test results. The guidance calls for a second review of the test results after the IST engineer completes the Test Results Sheet Range Review section of the STP. The licensee has committed to making procedural changes, by October 1, 1992, to assure multiple levels of review for alert range classification. A review of numerous additional surveillances by the inspectors did not identify any other instances of an exceeded valve stroke alert limit. The inspectors considered the missed alert an isolated occurrence with minimal safety significance and the licensee has taken immediate actions to resolve this matter. Therefore, this violation is not being cited per the enforcement discretion provisions of 10 CFR 50 Part 2, Appendix C, Section VII.B.

2.2.b Limiting Stroke Time Values

The NRC established guidelines regarding limiting values of full-stroke time for power-operated valves in Generic Letter (GL) 89-04. The purpose of the limiting value of full-stroke time is to establish a value for taking corrective action on a degraded valve before the valve reaches the point where there is a high probability of failure to perform its safety function if called upon. The GL does not provide specific methodology for establishing the limiting values.

The licensee is using new limiting values as recommended in the GL for the stroke times of certain power-operated valves. However, the methodology for establishing the values is not documented in any approved station procedure. The inspectors identified valves for which the licensee had established new limiting values, but was not using these new values as the acceptance criteria in their STPs. The inspectors verified that the new limiting values were not exceeded in any of these STPs.

The licensee provided the inspectors with a draft procedure that will document the methodology currently in use. The inspectors reviewed the draft methodology and noted that it should provide limiting values of full-stroke time consistent with the intent of GL 89-04. The licensee agreed to "develop an approved controlled procedure that governs the methodology to be used to establish the stroke time limits for all IWV-1100 valves," by October 30, 1992. In addition, the licensee agreed to "complete a review of all existing stroke time limits of IWV-1100 valves using the procedure," by December 30, 1992. As part of this review, STPs will be updated to reflect any new or changed limiting values. The inspectors concluded that these agreed upon changes would address their concerns on consistent methodology and utilization of limiting values.

3.0 TEST WITNESSING

On June 22, 1992, the inspectors witnessed the performance of two surveillance test procedures for four valves in the licensee's IST program. The inspectors observed partial stroke tests of the No. 21 and No. 22 MSIVs from the control room and local panel 2C161. Both MSIVs met the acceptance criteria of STP 0-47B-2, "MSIV Partial Stroke Test," Revision 0. The licensee performs this partial stroke testing as required by ASME Section XI, Article IWB-3412. The inspectors also observed operators performing STP 0-65B-1, "11/12 Containment Cooler Service Water Outlet Valve Quarterly Operability Test," Revision 0, from the control room. The two service water valves passed the acceptance criteria of the STP. This STP verified the valves would close within the Technical Specification required stroke time. The inspectors did not identify any problems during their observations of the two STPs, and they concluded that the tests were well performed.

4.0 CORRECTIVE ACTION

The inspectors reviewed licensee actions involving the operability of valve 2-SW-5173-CV (now to be called "the valve"). The valve failed its surveillance test (STP 0-65-2) in December 1991. According to the valve STP stroke time data form, the valve had not failed a surveillance in two years. This valve is an air-operated butterfly valve used for controlling the salt water system flow to the ECCS pump room air coolers. The normally closed valve, which is on the 8 inch line to the coolers, is the first downstream valve from the 30 inch main salt water header. The valve safety position is open. This ensures a cooling water flow path to the coolers in the event of a loss of power to the valve.

Chronology:

- December 10, 1991: The valve failed to stroke full open STP 0-65-2. A maintenance request (MR) was initiated, the valve was manually opened and entered in the locked valve deviation log, and a "temporary note" indicating it was inoperable was placed on the control switch.
- January 1992: The valve was flushed during a bi-monthly 72 hr flush of the 22 ECCS room air cooler (PE 2-12-07-0-02M).
- February 29, 1992: The valve passed STP 0-65-2. However, administrative controls to maintain the valve open were kept in place.
- April 4, 1992: The valve failed during STP 0-65-2 due to intermittent control room indication. The valve is noted to have stopped at the 90% open position.

- May 1, 1992: Acting on the December MR, Maintenance flushes the line and successfully strokes the valve several times. Maintenance tells Operations that debris had prevented the valve from stroking open and was cleared.
- Operations ran the STP as a post-maintenance test and the valve passed. The temporary note was removed and the valve was placed back in service (closed).
- May 10, 1992: The valve fails to go full open during the bi-monthly 72 hr flush of the ECCS room air cooler. A second maintenance request was written (MR 92002177) and the valve was manually placed in the open position for the remainder of the 72 hr flush.
- May 13, 1992: The valve is placed back in service (closed) at the conclusion of the 72 hr flush of the ECCS room air cooler.
- May 22, 1992: NRC Resident Inspector discussed the basis for returning the valve to its normal closed position with Operations. Operations was unable to find the paperwork for the maintenance tag on the control switch.
- Operations ran the STP and the valve failed. A third MR was written, a temporary note placed on the control panel and a locked valve deviation entry was made. An Issue Report was also written.

The chronology indicates a repeating scenario in which the valve fails to fully open, is flushed, and then passes its STP. Prior to December the valve had not failed an STP in two years. When the valve failed the STP in December, the licensee took immediate actions to maintain the valve in its open safety position and declared it to be inoperable. However, on May 1 the shift supervisor determined the valve was operable and returned it to service based on a recommendation from Maintenance and the fact that it passed the STP. This action was inadequate as the valve failed to stroke fully open a third time on May 10, 1992, and a fourth time on May 22, 1992.

The inspectors concluded that the valve stroke at 90% open would provide substantial flow to the cooler and there would be minimal safety significance. However, continued failures with this valve indicates that the root cause of the problem has not been determined and the licensee's actions to preclude repeated failures were inadequate. This is a violation of the requirements in 10 CFR 50, Appendix B, Criterion XVI and the licensee's QA program (Violation 50-318/92-18-01).

5.0 CONCLUSION

Management attention was good as evidenced by a good overall IST program, with a few isolated exceptions in the areas of surveillance frequency, procedure update, and documentation for the limiting stroke time determination.

The actions taken involving the operability of 2-SW-5173-CV were inadequate, as stated in section 4.0, and resulted in the violation of corrective action requirements specified in 10 CFR 50, Appendix B. A missed valve stroke alert limit described in section 2.2.a. was classified as a non-cited violation.

6.0 EXIT MEETING

The inspector met with those denoted in Attachment 1 on June 26, 1992, to discuss the preliminary inspection findings.

ATTACHMENT 1

Persons Contacted

Baltimore Gas and Electric Company

- * R. Denton, Plant General Manager
- * G. Detter, Director of Nuclear Regulatory Matters
- * D. Dobson, IST Engineer
- * J. Hill, GS-NPO
- * P. Katz, Superintendent of Technical Support
- * D. Muth, Compliance Engineer
- * S. Welp, Principal Engineer

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- * A. Howe, Resident Inspector - Calvert Cliffs
- F. Lyon, Resident Inspector - Calvert Cliffs
- P. Wilson, Senior Resident Inspector - Calvert Cliffs

- * Denotes presence at the exit meeting held on June 26, 1992