UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-321/95-19 and 50-366/95-19

Licensee: Georgia Power Company
P. O. Box 1295
Birmingham, AL 35201

Docket Nos.: 50-321 and 50-366 License Nos.: DPR-57 and NPF-5

Facility Name: Edwin I. Hatch Nuclear Plant Units 1 and 2

Inspection Conducted: October 2 - 6, 1995

Inspector: Edward R. Girard 11/2/95
E. Girard, Reactor Inspector Date Signed

Accompanying Personnel: M. Holbrook, Contractor, INEL

Approved by: Albert F. Gibson for 11/3/95
D. Verrelli, Acting Chief Date Signed
Special Inspection Branch
Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted as a followup to NRC Inspection 95-17, which examined three failures of the licensee's Low Pressure Coolant Injection (LPCI) inboard injection motor-operated valves (MOVs) and the potential pressure locking of LPCI and Core Spray Injection (CSI) inboard injection MOVs. At the conclusion of Inspection 95-17 the licensee had not completed its related investigations and corrective actions. The current inspection assessed the subsequent investigation results and corrective actions to verify that conditions adversely effecting operability were adequately identified and corrected. The inspection covered the following licensee investigations and corrective actions:

(1) The investigation and corrective actions for the LPCI MOV failures.

(2) The investigation and corrective actions for MOV motor shaft keyway cracking found when the licensee examined the failed LPCI MOVs.

(3) An investigation to determine whether the stem nuts (ball screw type) on two of the LPCI MOVs had degraded, increasing the torque required for the valve operation.

(4) The corrective actions taken to ensure that the LPCI and CSI inboard injection MOVs would not pressure lock.

(5) The investigation into why the licensee's previous pressure locking evaluation for the LPCI and CSI inboard injection MOVs had not considered that pressure locking might be caused by reactor pressure entering and becoming trapped in the valve bonnets.

Results:

The licensee's investigations were found to generally be thorough and to provide plausible explanations as to the causes of adverse of conditions. However, the causes could not be fully confirmed with the available data. The corrective actions were thorough, well-planned, and conservative. The inspectors concluded that the licensee's investigations and corrective actions, some of which were still in progress, were sufficient to ensure operability.

The inspectors noted two licensee weaknesses during the inspection:

(1) The licensee used a comparison of closing amperages measured at the Motor Control Center (MCC) as evidence that a misaligned or undersized bushing had caused a large amperage load increase and led to the motor failure. Comparing more accurate licensee diagnostic test amperages, which had been measured at the MOV, the inspectors determined that the amperage increase was much less severe than determined by the licensee. The inspectors also found that the amperage measurements recorded in the licensee's MOV trending database were the less accurate MCC values. Licensee personnel agreed that the appropriate measurements had not been used and stated they would assure that this was corrected.

(2) An internal licensee memorandum had been prepared to explain why the licensee's pressure locking evaluation did not consider pressure locking of the LPCI and CSI MOVs by reactor pressure entering and being trapped in the valve bonnets. The memo stated that the potential for pressure locking the MOVs under such conditions had been considered but that it was discounted based on discussions with valve manufacturers. The inspectors found this explanation unsatisfactory, as it was not supported by a thorough, well-documented engineering evaluation. Further, the memo gave no reason for omitting any explanation from the previously documented pressure locking evaluation. This issue will be further evaluated by the NRC in reviewing the licensee's response to the related violation 95-17-01.

The inspectors observed strengths in the licensee's investigations and corrective actions for the previous LPCI MOV failures and potential pressure locking of the LPCI and CSI valves. Licensee technical personnel were observed to clearly understand the important issues involved and had responded with thorough investigations and thorough, well-planned, and conservative corrective actions.

No violations or deviations were identified.

REPORT DETAILS

1.0 Persons Contacted

Licensee Employees

*P. Fornel, Maintenance Manager
*J. Graves, Motor-Operated Valve Maintenance Engineer
*J. Hammonds, Regulatory Compliance Supervisor
T. Metzler, Nuclear Safety and Compliance
*T. Moore, Assistant General Manager - Plant Operations
*H. Sumner, General Manager - Nuclear Plant
*S. Tipps, Nuclear Safety and Compliance Manager

Other Organizations

Southern Nuclear Operating Company, Hatch Project Support

*W. Warren, Senior Nuclear Specialist

Nuclear Regulatory Commission

*R. Holbrook, Senior Resident Inspector

*Attended exit interview

2.0 Followup Assessment of Investigations and Corrective Actions for Failures of LPCI MOVs and for Potential Pressure Locking of LPCI and CSI MOVs (IP 92903)

This inspection was conducted to followup on Inspection 95-17, which examined three failures of LPCI inboard injection MOVs and the potential pressure locking of LPCI and Core Spray Injection (CSI) Inboard Injection MOVs. At the conclusion of Inspection 95-17 the licensee had not completed its related investigations and corrective actions. The current inspection assessed the subsequent investigation results and corrective actions to verify that conditions adversely effecting operability were identified and corrected. NRC inspectors assessed the licensee's investigation and corrective actions through reviews of related documentation, discussions with involved licensee personnel, and observation of valve components and component drawings and photographs. The documentation reviewed included the MOV diagnostic test records, Event Review Team (ERT) Report 95-07, General Electric Metallurgical Evaluation Report GENE E11-00074-01, the Torque Switch Setting Guide, the maintenance history for the MOVs, Hatch MOV Trend Review Report for November 1993 to June 1995, MOV Testing and Trending Data Sheets, 10 CFR 50.59 Evaluations for Modifications to 2E11F015A and B, the current outage work schedule, and letters from TVA to the NRC reporting MOV motor shaft cracking in accordance with 10 CFR Part 21 (first letter dated November 12, 1986). The licensee's documentation and actions were judged primarily against 10 CFR 50.59; 10 CFR 50, Appendix B, Criterion XVI; and Technical Specification requirements. The inspection, and its

findings and conclusions are described below under five subheadings of licensee investigations and corrective actions.

2.1 Investigation and Corrective Actions for Failures of LPCI Inboard Injection MOVs

2.1.1 Background

Hatch Units 1 and 2 each have an A and a B train LPCI inboard injection MOV. These MOVs are respectively identified as 1E11F015A, 1E11F015B, 2E11F015A, and 2E11F015B. 2E11F015B experienced motor burn-up failures when actuated to open for surveillance tests performed on May 19 and June 18, 1995. On July 2, 1995, 1E11F015B failed to open in a surveillance test due to a motor shaft failure. Cracks were found emanating from its keyway. Except for the second 2E11F015B motor to burn up, the failed and unfailed LPCI MOV motors had previously been in service for years and had been surveillance tested quarterly.

Following the shaft failure of 1E11F015B described above, the licensee inspected the unfailed MOVs 1E11F015A and 2E11F015A. The 2E11F015A motor shaft was found to have keyway cracks, while 1E11F015A had a sheared motor pinion key but no cracks. To further investigate the failures and cracking, the shafts of the two burned up 2E11F015B motors were inspected. The first 2E11F015B motor to burn up was found to contain keyway cracks. The other, in service less than a month, had none. Analysis found that the 1E11F015A sheared key was of soft 1018 steel, while the other MOVs inspected had keys of stronger 4140 steel.

Prior to the above failures, the licensee had determined that the ratings of the motors installed on these 24-inch flexible-wedge gate valves were being exceeded during surveillance testing. Additionally, the actuator ratings were identified as being exceeded on 1E11F015A and 1E11F015B. The licensee's evaluation of these conditions was documented in a memorandum dated June 8, 1994. The evaluation recommended revising the surveillance test to lower the differential pressure across the valve discs, thereby reducing the force required to open the valves to within the rated capabilities of the motors and actuators. The evaluation indicated it would be acceptable to continue the current surveillance testing for 100 cycles, pending revision of the procedures. Continued operation for this number of cycles was considered acceptable because (1) the valves had performed satisfactorily during years of previous quarterly surveillance tests, and (2) the valve actuator and motor ratings would not be exceeded in a design accident. The licensee's design-basis differential pressure calculations showed that the opening differential pressure across a LPCI Inboard Injection Valve disc would be about 1000 psid (assuming reactor-side check valve leakage) during surveillance testing, but only about 230 psid during the worst-case design accident.

The NRC reviewed the circumstances of the above failures and faulted the licensee for not having taken more prompt and effective corrective

action to prevent further failures after the first motor burn-up failure. This was documented in violation 95-17-01.

At the time of inspection 95-17, the licensee had not completed its evaluation of the failures of the LPCI inboard injection MOVs. In a subsequent Enforcement Conference between the licensee and NRC Region II on September 13, 1995, the licensee indicated that they considered the failures to have resulted from different causes. While high surveillance test differential pressure was considered a contributor, other factors were highlighted as separate causes of each failure. The first motor burn-up failure was attributed to time in service and degradation resulting from motor stalls that had occurred during 1986. The second burn-up was attributed to an increased load from inadequate alignment and fit of the worm shaft into the worm shaft bushing in the motor housing. The shaft failure and the cracks found in other shafts were attributed to design factors such as the high speed of the motor and valve, time in service, shaft and key material, and the hammer blow effect which occurs when the type of actuator that powered the motor changed direction. The licensee also noted that the cracking was very similar to MOV motor shaft keyway cracking described by TVA in a 10 CFR 21 report for the Watts Bar site.

2.1.2 Inspection Results - Licensee Investigation

The inspectors found that the licensee's ERT Report 95-07, "Multiple Failures of LPCI Injection MOVs," postulated causes of the MOV failures that were generally consistent with those described to Region II in the September 1995 Enforcement Conference. As described in the following paragraphs, the inspectors found that the causes identified were plausible but that they could not be fully verified from the available data.

The ERT Report identified brief stalls that occurred in 1986 as an important factor in the failure of the first motor. The inspectors agreed that these stalls might have degraded the motor insulation and that further degradation of the motor with age might have led to the failure. However, the licensee had no data to show that the stalls had caused significant degradation of the motor insulation and there had been no subsequent preventive maintenance checks to provide evidence of further degradation with age.

The important factor identified by the ERT Report for the second motor failure was inadequate clearance between the actuator worm shaft and the motor housing bushing, resulting in excessive friction that overloaded the motor. As an indication of the increased load caused by the friction, the ERT Report stated that the motor had experienced a high amperage reading during testing performed following its installation. The report compared this reading, 46 amps, to a 20 amps reading obtained when the motor that replaced it was tested with a properly aligned and sized bushing. Both amperages were stated to have been obtained on "torque out" (closing torque switch trip). The inspectors could not view the bushing from the failed motor, as it was missing, but discussed

the condition with a licensee engineer and observed its location on a similar motor. The engineer stated that the bushing had shown wear on one side. The inspectors attempted to verify the amperages stated by the ERT Report, using amperage traces recorded during diagnostic tests that had been performed following the motor installations. The inspectors found that the 46 amps value was correct but that the peak value obtained from the motor with the correctly aligned and sized bushing was much higher than stated. The diagnostic trace (Test 17) for the second motor replacement showed that the correct peak current was approximately 34 amps, not 20 amps. Licensee personnel stated that the current values listed in the test summary sheets were acquired using a clamp-on amp meter at the MCC. This concerned the inspectors because the licensee did not use the most accurate current data in their root cause analysis. Using diagnostic data, the second replacement motor still drew less current in the closing direction, but the differences were less and could possibly be explained as a natural variation between motors. The inspectors also noted that there was little difference in the unwedging (valve opening) current for the two motors which was the failure direction of operation for both motors. The inspectors reasoned that if the worm shaft bushing was the cause of the high motor current, increased amperage should be seen in the opening direction.

ERT Report 95-07 identified the following factors as contributing to the third MOV failure (a motor shaft failure) and to cracks found in the shafts of the other LPCI Inboard Injection MOVs: time in service, actuator hammer blow effect, high motor RPM, shaft material, key material, and keyway geometry. The licensee's investigation into the cause and the extent of other valves affected was still in progress. The investigation is discussed further in 2.2 below.

The inspectors reviewed all of the past diagnostic tests for the LPCI Inboard Injection MOVs to determine if there was any evidence of a cause not considered by the licensee. There had been several static tests (without differential pressure) and one dynamic test (with differential pressure) for each MOV. The dynamic tests were conducted at a differential pressure well below the value they could experience when opening for surveillance tests (e. g., 290 versus 1010 psi) but above the design-basis accident value (about 230 psi). The inspectors found no clear evidence of a failure mechanism not considered by the licensee. However, one matter was questioned. The dynamic test data for 2E11F015B showed that it did not quite fully close with adequate thrust margin. This was evidenced by the lack of a clear seating transient in the force trace. The test was conducted under a differential pressure that exceeded the design-basis accident value for this valve. The test package entry inaccurately stated that the VOTES sensor had a "reversal" at the end of the force trace, when the trace characteristic was instead caused by the valve not fully seating. A licensee engineer agreed with the inspectors and stated that the error had not been recognized at the time of the test (conducted in 1992) due to inexperience but that it was subsequently acknowledged and evaluated as acceptable. The inspectors accepted this explanation. They were aware of licensee identification and correction of such errors from Inspection 95-02 and had confirmed

that this MOV was to receive another dynamic test during the current outage. The adequacy of the opening and closing of this MOV will be subject to further NRC review in a future NRC inspection to close violation 95-17-01.

In reviewing licensee MOV test records the inspectors found that the amperage measurements recorded in the licensee's MOV trending database were the less accurate MCC values mentioned previously above. Licensee personnel agreed that the appropriate measurements had not been used and stated they would assure that this was corrected.

2.1.3 Inspection Results - Corrective Actions

The inspectors were informed that the licensee had recently decided that the LPCI Inboard Injection MOVs would only be surveillance tested during cold shutdowns. Therefore, none of the MOVs would have to operate near or above their motor ratings to overcome the high differential pressure potentially present during normal operation. Additionally, the inspectors confirmed that MOV 2E11F015B was be disassembled, inspected, and dynamically tested during the current outage to ensure its capabilities (Maintenance Work Orders 950284998 and 950119298). The inspectors determined that the licensee had replaced the motors on all of the LPCI Inboard Injection MOVs. For Unit 2, the replacements were larger, slower speed motors with higher torque ratings. For Unit 1, new but identical size motors were used. Licensee personnel stated that other motors found with keyway cracks during the current outage would initially be replaced with like motors. Long-term corrective actions for keyway cracks were to be determined based on the results of the investigation currently in progress. The inspectors concluded that the corrective actions for the motor failures were satisfactory to ensure their future operability. Their assessment of the corrective actions for the keyway cracks is described in 2.2 below.

2.2 Investigation and Corrective Actions for MOV Motor Shaft Keyway Cracking

2.2.1 Background

Background on keyway cracking found in the motor shafts of LPCI Inboard Injection MOVs is described in 2.1.1 above.

2.2.2 Inspection Results - Licensee Investigation

The factors which the licensee identified as contributing to the keyway cracks have been described above, and included service age. The inspectors found that the effect of service age was supported by identification of fatigue as the cracking mechanism (per Report GENE E11-00074-01), the age of the shaft that had failed (in service 17 years), and that the only motor shaft exhibiting no damage was in service for about one month.

The inspectors reviewed the results of diagnostic tests that had been performed on the LPCI Inboard Injection MOVs before cracks were discovered. They found no evidence either to support another failure mechanism or refute the causes proposed by ERT Report 95-07.

The NRC inspectors were informed that the licensee's investigation of the cracking was continuing. Licensee personnel stated that they had contracted with the firm ALTRAN to study the issue and showed the inspectors a preliminary report of the study. A memorandum (Log HL-5035) dated September 20, 1995, recommending penetrant exams of 27 Unit 2 MOV motor shafts, and records of the exams that had been completed were reviewed by the inspectors. Later, the inspectors were informed of 29 Unit 2 and 4 Unit 1 MOVs that had been examined. Of these, six Unit 2 and all four Unit 1 MOVs had shaft cracks (including the LPCI Inboard Injection MOVs previously found to have cracks).

As mentioned in 2.1.2 above, licensee personnel stated that they had determined that TVA had reported similar MOV motor shaft cracks for the Watts Bar site. The inspectors reviewed the TVA reports and agreed that the cracking appeared like that found at Hatch. Watts Bar had identified keyway cracks in the motor shafts of three MOVs, including two containment sump suction isolation MOVs. Both the Hatch and Watts Bar motor shaft cracks were on large MOVs ($\geq$ 10-inch) with high speed motors 3400 - 3600 RPM). The inspectors noted that the keys in the shafts of the Watts Bar motors were all of soft 1018 steel versus high strength 4140 steel keys in the Hatch LPCI Inboard Injection MOV motors. Also, the exact importance of age was unclear as the MOVs at Watts Bar had never officially been in service, though they might have been operated a number of times.

Based on the licensee's contracted study, extensive number of MOV exams, and identification of reported motor shaft cracks at Watts Bar, the inspectors concluded that the licensee was conducting a thorough, well-considered investigation.

2.2.3 Inspection Results - Corrective Actions

As mentioned in 2.1.3, the inspectors were informed that the licensee's immediate corrective action for the motor shaft cracking was to replace the motors that had cracks with a like motors. An exception was the motors on 2E11F015A and B. These were replaced with larger, slower motors to overcome potential pressure locking. Final corrective actions were to be determined following completion of motor exams and the study contracted with ALTRAN. The inspectors concluded that this was satisfactory for the short term, based on evidence that the cracks were being propagated by fatigue and that previous years of operation at Hatch had resulted in only the one failure of an MOV to operate.

The inspectors reviewed static diagnostic tests performed on the LPCI Inboard Injection MOVs after their motors were replaced and verified that the test results indicated satisfactory MOV performance with no anomalous results.

2.3 Investigation of the Degraded Performance of the Ball Screw Stem Nuts on Two of the LPCI MOVs

2.3.1 Background

The LPCI inboard injection MOVs have ball screw stem nuts. Stem nuts are used in converting motor torque to valve opening and closing thrust forces. The ball screw type stem nut is used because of its low friction losses during the conversion. Prior to Inspection 95-17 Hatch had determined that the stem nuts on MOV 2E11F015A and B had unexpectedly high friction coefficients. This determination was based on analyses of torque outputs calculated from spring pack and torque switch test data. High friction coefficients would increase the motor loads during valve operation and might lead to motor burn-up like that experienced by MOV 2E11F015B. Licensee inspections to determine the cause of the high friction had been planned for the current outage.

During Inspection 95-17, the high friction coefficient previously identified for the ball screw stem nut on MOV 2E11F015A became a concern in evaluating the capability of the MOV to overcome pressure locking. Inspection Report 95-17, Section 2.3.3, questioned the torque load that the licensee used in evaluating the past operability of MOV 2E11F015A. Instead of relying on a value determined from their previous spring pack and torque switch tests, the licensee relied on a new estimate made using diagnostic motor amperage measurements and a standard motor curve. In their September 13, 1995, Enforcement Conference the licensee stated that they had made the new determination based on the best available information, as the previous determination was found to be in error.

2.3.2 Inspection Results - Licensee Investigation

Licensee personnel stated that their previous torque determinations were determined incorrect in discussions with a representative of the actuator manufacturer. The representative had shown how their reinstallation of spring packs led to large uncertainties in the torque determinations. The NRC inspectors viewed the design and agreed.

The inspectors confirmed that the licensee still planned to inspect the installed ball screw mechanisms. A licensee maintenance engineer stated that new replacements would be installed in place of current mechanisms prior to the inspections and the NRC inspectors observed one of the replacements. Subsequently, the maintenance engineer informed the NRC inspectors that the stem nut removed from 2E11F015A had been inspected and found acceptable. The engineer also stated that a dynamic test of the LPCI Inboard Injection MOVs was planned which would include accurate torque measurements and thereby further verify proper functioning of the stem nuts.

2.4 Corrective Actions to Ensure that LPCI and CSI Inboard Injection MOVs Will Not Pressure Lock

2.4.1 Background

During Inspection 95-17 the NRC identified that the licensee's LPCI and CSI Inboard Injection MOVs appeared susceptible to pressure locking caused by process fluid (reactor) pressure entering their bonnets prior to a Loss of Coolant Accident. Licensee personnel stated that their previous evaluation did not indicate consideration of that pressure locking mechanism. In response to a request from Region II the licensee evaluated operability of the LPCI and CSI MOVs. Based on a calculation, the licensee determined that MOV 2E11F015B should be modified to preclude the pressure locking but that no changes to the other MOVs were required. The modification consisted of changing the actuator gearing and providing a larger motor to overcome the calculated pressure locking force. For consistency, the licensee also performed this modification on 2E11F015A. The NRC questioned the actuator torque which the licensee determined in the calculation for MOV 2E11F015A but for future operability considered its effect adequately offset by the modification. Due to uncertainties regarding pressure locking force calculations, the NRC stated that these modifications would only be acceptable for the short-term. For long-term correction only methods of preventing or relieving the bonnet pressurization were currently considered acceptable. The NRC concluded that the licensee's actions to address the pressure locking had not been sufficiently prompt, in view of reports of past industry experience, and identified this as part of violation 95-17-01.

2.4.2 Inspection Results - Corrective Actions

The inspectors questioned licensee personnel as to what corrective actions were being instituted to ensure the long-term capabilities of the LPCI and CSI Inboard Injection MOVs against pressure locking. They were informed that holes were to be drilled in the flexible wedge discs of the valves to provide a vent path for relief of excessive buildup of bonnet pressure. The inspectors verified from the licensee's database that these modifications were to be performed on 2E11F015A and B during the current Unit 2 outage. Additionally, the inspectors verified that the licensee had properly documented 10 CFR 50.59 evaluations of the Unit 2 LPCI and CSI MOV modifications in Design Change Request 2H94-34. The inspectors concluded that the licensee was modifying the MOVs to ensure their long-term operability. Further NRC verification of the licensee's actions to ensure their valves will not pressure lock will be accomplished through inspection of the licensee's response to violation 95-17-01 and review of their responses to Generic Letter 95-07.

2.5 Investigation of Previous Pressure Locking Evaluation

2.5.1 Background

As described in 2.4.1 above, Inspection 95-17 identified that the licensee's pressure locking evaluation had failed to consider that pressure locking of the LPCI and CSI MOVs could be caused by reactor pressure entering and being trapped in the bonnets of the valves. As there had been industry reports of pressure locking from this cause, the licensee's failure to consider this in their evaluation and to provide appropriate prompt corrective action was cited in violation 95-17-01. In their September 13, 1995, Enforcement Conference with NRC Region II, the licensee stated that they had investigated and determined that the possibility of such pressure locking had previously been considered. However, it had been discounted based on information from valve manufacturers and this had not been adequately documented. According to licensee personnel, the valve manufacturers stated they had tested the MOVs under conditions that demonstrated they would open with fluid at above reactor pressure trapped in their bonnets.

2.5.2 Inspection Results - Licensee Investigation

The inspectors reviewed both the licensee's previous pressure locking evaluation report (Log: REA-8-3-349, dated March 29, 1988) and a recent memorandum (dated September 6, 1995) which explained why the report did not include an evaluation for pressure locking caused by process fluid pressure (e. g., reactor pressure) entering and being trapped in valve bonnets. The inspectors confirmed that the evaluation documented in the report did not mention that pressure locking mechanism or indicate any reason it was not being considered. The licensee memorandum explained that pressurization of the bonnets by process (reactor) fluid pressure had been considered in developing criteria for the evaluation described in the pressure locking evaluation report; however, it was ruled out based on conversations with valve manufacturers and an Architect and Engineering firm. The inspectors considered the explanation unsatisfactory, as it was not supported by a thorough, well-documented engineering evaluation. No reason was given as to why the 1988 evaluation report did not document or reference a basis for omitting pressure locking caused by process fluid pressure entering and being trapped in valve bonnets. Lacking appropriate supporting documentation the evaluation reported by the licensee was considered inadequate.

A licensee engineer informed the inspectors that another pressure locking evaluation had been initiated and provided its preliminary report. The new evaluation clearly assessed whether valves were susceptible to pressure locking caused by process fluid pressure entering their bonnets and the inspectors noted that it had identified that the LPCI Inboard Injection MOVs were susceptible. This matter is to be examined further by the NRC in a future inspection of the licensee's response to violation 95-17-01.

2.6 Conclusions

The inspectors concluded that the licensee's investigations were generally thorough and that they provided plausible explanations as to the causes of adverse conditions. However, the causes could not be fully confirmed with the available data. The corrective actions were found to be thorough, well-planned, and conservative. The inspectors concluded that the licensee's investigations and corrective actions, some of which were still in progress, were sufficient to ensure operability.

The inspectors noted weaknesses in the licensee's evaluation of motor amperage data and in an explanation of why their previous pressure locking evaluation report did not consider pressure locking of the LPCI and CSI MOVs due to reactor pressure entering and being trapped in the valve bonnets.

The inspectors observed strengths in the licensee's investigations and corrective actions for the previous LPCI MOV failures and potential pressure locking of the LPCI and CSI valves. Licensee technical personnel were observed to clearly understand the important issues involved and had responded with thorough investigations and thorough, well-planned, and conservative corrective actions.

3.0 The inspection scope and findings were summarized on October 6, 1995, with those persons indicated in Section 1. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

4.0 Acronyms and Initialisms

CFR - Code of Federal Regulations
CSI - Core Spray Injection
ERT - Event Review Team
INEL - Idaho National Engineering Laboratory
IP - Inspection Procedure
LPCI - Low Pressure Coolant Injection
MCC - Motor Control Center
MOV - Motor-Operated Valve
NRC - Nuclear Regulatory Commission
psid - pounds per square inch differential
VOTES - Valve Operation Test and Evaluation System