



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

Report Nos.: 50-321/95-25 and 50-366/95-25

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: December 4 - 8, 1995

Lead Inspector: E. H. Girard 1/5/96
E. Girard, Reactor Inspector, NRC Region II Date Signed

Accompanying Personnel: T. Scarbrough, Senior Mechanical Engineer, NRR
R. Cain, Engineering Specialist, INEL

Approved by: P. Fredrickson 1/5/96
P. Fredrickson, Chief Date Signed
Special Inspection Branch
Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection assessed the licensee's completion of a commitment to implement the recommendations of Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." Related Inspector Followup Items (IFIs) 95-02-01 through -05 were reviewed.

In addition to the above, three other previously identified items involving Motor-Operated Valves (MOV) were reviewed. These items were IFI 95-02-06, Unresolved Item (URI) 95-02-07, and Violation (VIO) 95-17-01.

Results:

The inspector found that several issues still remained to be resolved regarding the licensee's completion of implementation of GL 89-10. These issues were identified from the review of IFIs 95-02-01 and -05. The licensee was informed that they would be requested to provide written responses to the issues. The statuses of IFIs 95-02-01 and -05 are indicated below, each followed by a description of the issues to be resolved:

(Closed) IFI 50-321, 366/95-02-01, Determination of Settings for Valves Not Dynamically Tested.

This IFI identified a broad concern that the licensee had not adequately justified the assumed values of three parameters that were used to calculate the capabilities and settings for MOVs that had not been dynamically tested to demonstrate their performance at design-basis conditions. During the current inspection the licensee resolved most of the concern. However, three issues remained:

- The valve factor (VF) used in calculating the settings for Valves 2B31F031A/B, 1B21F016, and 1B21F019 had not been sufficiently justified.
- The valve stem coefficient of friction (COF) established was not adequately justified.
- The licensee was in the process of addressing new industry information on the performance of valves that could experience blowdown conditions.

The licensee was informed that the original IFI would be closed and that a written response would be requested for the above issues. A new IFI was identified for resolution of the issues, designated 50-321, 366/95-25-01, Valve Factor and Coefficient of Friction Issues.

(Open) IFI 50-321, 366/95-02-05, Scope of Valves and Testing.

This IFI identified concerns regarding the scope of MOVs and design functions that should be included in the Hatch GL 89-10 program. Licensee deletions involving over 50 MOVs were rejected in a formal NRC evaluation dated October 16, 1995. The inspector was informed that further licensee discussion with the NRC was under consideration and that the Hatch program had not been revised to re-incorporate the deletions. The NRC inspector verified that the involved valves were set and sized adequately to meet the intent of GL 89-10, relieving any immediate concern. He stated that the licensee would be requested to provide plans and a schedule for resolution of the scope issue and to verify that the involved valves would be maintained consistent with GL 89-10 until resolution of the issue.

The other IFIs reviewed during the inspection were adequately resolved and are considered closed.

The following licensee strengths and weakness were observed during the inspection:

Strengths

- MOV diagnostic testing records demonstrated good test performance and interpretation.
- Licensee personnel were very knowledgeable of the GL 89-10 issues.

Weakness

- The licensee's analysis of valve stem coefficient of friction results was not adequate.

In the areas inspected, violations or deviations were not identified.

REPORT DETAILS

1.0 Persons Contacted

Licensee Employees

- *C. Burdett, Electrical Maintenance Foreman
- *P. Fornel, Maintenance Manager
- *W. Glisson, Plant Engineering Supervisor
- *J. Graves, Motor-Operated Valve Maintenance Engineer
- T. Metzler, Supervisor, Nuclear Safety and Compliance
- *D. Ross, Senior Engineer, Nuclear Safety and Compliance
- *L. Sumner, General Manager
- *S. Tipps, Nuclear Safety and Compliance Manager

Other Organizations

Southern Nuclear Operating Company, Hatch Project Support

- J. Heidt, Nuclear Engineering and Licensing Manager
- *W. Warren, Senior Nuclear Specialist

Southern Company Services

- *C. Lynch, Senior Engineer

U. S. Nuclear Regulatory Commission

- *R. Holbrook, Senior Resident Inspector
- P. Fredrickson, Special Inspection Branch Chief, RII
- K. Jabour, Project Manager, NRR

- *Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2.0 Generic Letter 89-10 "Safety-Related Motor-Operated Valve Testing and Surveillance" (TI 2515/109)

This inspection continued an NRC assessment of the licensee's implementation of GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." In performing the assessment the inspector utilized guidance described in an NRC memorandum of July 12, 1994, "Guidance on Closure of Staff Review of Generic Letter 89-10 Programs" and in Temporary Instruction (TI) 2515/109, "Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance." The inspection of this area included a review of documentation and interviews with licensee personnel.

The licensee's implementation of GL 89-10 recommendations was previously assessed during NRC Inspection 50-321, 366/95-02, which determined that there were five matters remaining to be resolved. These matters were designated as Inspector Followup Items (IFIs) 95-02-01 through 05. In the letter that transmitted Inspection Report 95-02, the licensee was requested to provide a written response to IFIs 95-02-01 through 04. IFI 95-02-05, dealing with the licensee's deletion of certain valves and valve functions from their original GL 89-10 program, was already being addressed in separate communications between the licensee and the NRC Office of Nuclear Reactor Regulation. The licensee's response to IFIs 95-02-01 through -04 served as a basis for initial review and discussions held during the current inspection. Subsequently, more detailed analyses and supporting data were reviewed, including material regarding IFI 95-02-05. Details of the inspection and findings for each GL 89-10 item are described below (Sections 2.1 through 2.5), followed by the inspector's conclusions (Section 2.6).

2.1 (Closed) IFI 50-321, 366/95-02-01, Determination of Settings for Valves Not Dynamically Tested.

This IFI identified a broad concern that the licensee had not adequately justified the assumed values of three parameters that were used to calculate the capabilities and settings for gate and globe MOVs that had not been dynamically tested to demonstrate their performance at design-basis conditions. The parameters in question were valve factor (VF), stem coefficient of friction (COF), and load sensitive behavior (LSB). The values which the licensee had assumed were as follows:

- VF of 0.50 for gate valves and 1.10 for globe valves unless Hatch or industry dynamic testing of similar valves indicated a higher value would be more appropriate.
- COF of 0.15, except that the value obtained in static testing a valve was used if it was greater than 0.15.
- LSB of 10 percent.

At the conclusion of Inspection 95-02 Hatch was requested to re-evaluate and further justify the use of the above VF, COF, and LSB values in setting and sizing the following sample of MOVs that had not been dynamically tested: 1E41F001, 1E41F006, 1E11F008, 1E11F009, 1B31F031A/B, 1B21F019, 2B31F031A/B, 1B21F016, 2B21F016, 2B21F019, 2E51F007, 2E51F008, 2E51F013, 2G31F001, 2G31F004, 2E21F005A/B, 2E41F001, 2E41F003, and 2E41F006.

In the current inspection the inspector reviewed the following information: (1) the documented justifications which the licensee had prepared for the sample of MOVs, (2) the calculated thrust capability margins for the MOVs at their as-left settings, (3) the statistical evaluations of static test COF and dynamic test LSB values obtained in the licensee's program, and (4) the static diagnostic test data for the sampled MOVs. The inspector's findings were as follows:

Valve Factor

The licensee justified the adequacy of the VFs primarily on the basis of comparisons to results obtained at Hatch or elsewhere in the industry from dynamically testing similar valves. Margins in capabilities at current settings were reported to further support the capabilities of the valves to overcome uncertainties.

The inspector found that adequacy of the assumed VF for four valves needed further confirmation. No Hatch or industry dynamic test data was found from which an adequate comparison could be drawn. These were 28-inch Lunkenheimer flexible-wedge gate valves 2B31F031A/B; 3-inch Pacific flexible-wedge gate valve 1B21F016; and 3-inch KSB flexible-wedge gate valve 1B21F019.

Industry testing has revealed that potentially unpredictable valve factors could result from closing gate valves under blowdown conditions. EPRI has recently identified recommendations for rounding sharp edges and ensuring proper internal clearances in blowdown valves. The licensee was in the process of addressing this new information. Hatch personnel had initiated a procedure change which would inspect and provide any necessary correction to the valves at their next internal valve maintenance. The change was still undergoing review and approval at the conclusion of the inspection.

Stem Coefficient of Friction

Hatch relied on a statistical analysis of COFs from static testing to support the assumed value of 0.15. The inspector reviewed the analysis, Calculation SMNH 95-03, Rev. A, and found that it determined that the mean value of COF would be less than 0.14 with a 95 percent confidence level. However, it did not demonstrate a high confidence that an individual valve would have a COF less than the 0.15 assumed by the licensee. A review of the 44 COF data points used in the licensee's calculation found 9 (20 percent) greater than the 0.15 assumption. The inspector concluded that the analysis was inadequate and that the COF assumption of 0.15 was not justified. Further, the inspector noted that reliance on static COF values may be inappropriate, as dynamic values may be higher.

Load Sensitive Behavior

The inspector analyzed the data which the licensee had used to support the assumed 10 percent value for LSB. The LSB was modelled as biased (mean LSB) and random uncertainties (two standard deviations of the LSB data). The random LSB uncertainty was combined with instrument errors through the square root sum of the squares method. The inspector's analysis yielded overall LSB and instrument error uncertainty approximately equal to that calculated by Hatch personnel assuming 10 percent LSB as a direct bias added to the equipment error. The inspector considered Hatch's value for load sensitive behavior to be adequate.

Summary

The inspector found that most of the original concern expressed in this IFI was resolved. However, three issues remained:

- The VF used in calculating the settings for Valves 2B31F031A/B, 1B21F016, and 1B21F019 had not been sufficiently justified.
- The COF established was not adequately justified.
- The licensee was in the process of addressing new industry information regarding performance of valves that could experience blowdown conditions.

The licensee was informed that the original IFI would be closed and that a written response would be requested for the above issues. A new IFI was identified for resolution of the issues that remained. The new IFI was designated 50-321, 366/95-25-01, Valve Factor and Coefficient of Friction Issues. In his review the inspector noted a particular weakness, the licensee's inadequate statistical analysis of COF data discussed above.

2.2 (Closed) IFI 50-321, 366/95-02-02, MOVs With Marginal Capabilities.

This IFI identified a concern that fourteen MOVs had margins in design-basis capabilities of less than 5 percent. The inspector had judged these conditions acceptable for the short term, based on review and discussion of licensee evaluations, but questioned long term acceptability. The licensee subsequently committed to increase the margins for these valves above 5 percent and provided a schedule for completion in a letter to the NRC dated July 3, 1995. The letter stated that the margin of one of the nine Unit 2 MOVs had already been increased and that the remainder (8) would be increased by December 31, 1995. The (5) Unit 1 MOVs were to have their margins increased by May 31, 1995. These dates were intended to permit the changes to be accomplished for Unit 2 in a Fall 1995 refueling outage and for Unit 1 in a Spring 1996 outage.

In the current inspection the NRC inspector verified completed copies of work orders that increased the margins for the Unit 2 MOVs. Margin data provided separately by the licensee indicated that the margins for these valves had been increased to above 20 percent. The latest licensee margin evaluation showed only one of the original 14 MOVs to have a margin of less than 5 percent. This was Unit 1 MOV 1G31F004, which had a positive margin of 3.6 percent. With the margin increases already completed and the licensee's commitment for the remainder, the inspector considered this followup item resolved.

- 2.3 (Closed) IFI 50-321, 366/95-02-03, Revision to Account for Torque Switch Repeatability.

Procedure 53IT-TET-002-0S defined the requirements necessary before returning an MOV to service after diagnostic testing. The acceptance criterion for the closed direction, where the thrust available at control switch trip must exceed the required thrust, did not include a minimum thrust margin to account for torque switch repeatability. This IFI identified that the thrust margin omission should be corrected.

In the current inspection the NRC inspector reviewed Rev. 5 of Procedure 53IT-TET-002-0S and verified that the correction had been incorporated. This resolved the inspector's concern.

- 2.4 (Closed) 50-321, 366/95-02-04, Adequacy of Periodic Verifications and Margin.

This item identified an NRC concern that the periodic testing proposed by the licensee did not have specific plans for dynamic testing and that no margin was specified for age-related degradation. The licensee's program provided only for static periodic testing.

Subsequent to inspection 95-02, the NRC determined that it would prepare a generic letter to provide further guidance on periodic verification. The licensee's present plans are considered adequate pending NRC issuance of the generic letter and review of licensee response actions.

- 2.5 (Open) 50-321, 366/95-02-05, Scope of Valves and Testing.

This IFI identified concern as to the scope of MOVs and design functions that should be included in the Hatch GL 89-10 program. During Inspection 95-02 the NRC Office of Nuclear Reactor Regulation was in the process of reviewing the licensee's deletion of valves from their original GL 89-10 program. Subsequently, licensee deletions involving over 50 MOVs were rejected in a formal NRC evaluation dated October 16, 1995.

During the current inspection the inspector found that the licensee had not returned the deleted MOVs to their GL 89-10 program in accordance with the results of the NRC evaluation referred to above. Licensee personnel stated that they were awaiting the results of an NRC evaluation of deletions from the Browns Ferry GL 89-10 program before taking further action. The NRC inspector verified that the involved valves were set and sized adequately to meet the intent of GL 89-10, relieving any immediate concern. He stated that the licensee would be requested to provide plans and a schedule for resolution of the scope issue and to verify that the involved valves would be maintained consistent with GL 89-10 until resolution of the issue.

3.0 Review of Open Items Not Directly Related to GL 89-10

3.1 (Closed) IFI 50-321, 366/95-02-06, High Packing Load.

This item identified a concern that the effects of installation of new packing were not sufficiently understood, as in some cases the loads were much greater than predicted. During Inspection 95-02 the NRC inspector noted that the packing load on valve 2B31F031A was about 16,000 lbs. The predicted load recorded in the Torque Switch Setting Guide (TSSG), was 4000 lbs. The torque setting for 2B31F031A had to be increased to provide for the higher packing load.

In the current inspection the inspector discussed the reason for the high packing load with licensee engineers. The engineers explained that the packing installations had been investigated and that the unexpectedly high packing loads were found to be the result of packing configurations having been installed that were different than planned. The inspector verified that the valves had been repacked. He reviewed the new packing load obtained for 2B31F031A and found that it had been reduced to a more reasonable value, 5620 lbs. Additionally he verified that Southern Nuclear - Hatch Project Discrepancy Report 94-SNC-042 had been completed for the valve, providing a review of motor capability assumptions and any necessary revision of the licensee's TSSG.

3.2 (Closed) URI 50-321, 366/95-02-07, Review of Operability Evaluation for Three Motor-Operated Valves.

This unresolved item identified a concern as to the operability of three MOVs. Two, 2P41F115A and 2P41F115B, were identified by the licensee as being susceptible to pressure locking. A third, 2E11F009, had a small negative margin in its calculated capability to provide the thrust required to close for a line break (if opened) for shutdown cooling. The inspector's findings in the current inspection are described in the following paragraphs:

2P41F115A and 2P41F115B

The licensee provided the inspector an informal chronology which indicated the potential for these valves to pressure lock was identified in late May 1994. Testing performed in June 1994 was unable to induce pressure locking but the licensee determined that further actions would be taken to ensure the valves could not pressure lock. Modification DCR 94-34 was initiated to prevent pressure locking and operating order 00-03-0694S was issued to provide that the valves should remain open until the correction could be completed. The inspector reviewed and verified documentation of the June 1994 pressure locking test, the operating order, and the completed modifications (work orders 29402453 and 29402454). The inspector found that these actions were sufficient to ensure the valves' operability.

2E11F009

The licensee had prepared a further evaluation of the operability of this MOV, which was reviewed by the inspector. This evaluation was identified as File No. RES ST-90030 and dated December 1, 1995. The evaluation reduced the valve factor based on results obtained on similar valves and used the measured packing load rather than the higher value originally assumed. The inspector found that this evaluation adequately demonstrated the operability of the MOV.

3.3 (Closed) Violation 50-321, 366/95-17-01, Failure to Provide Prompt Corrective Action to Preclude MOV Failures.

This violation identified the licensee's failure to promptly correct significant conditions adverse to quality involving multiple failures of low pressure coolant injection (LPCI) MOVs and potential pressure locking of LPCI and core spray injection (CSI) MOVs. The following examples were cited:

- Failure to promptly and adequately implement a LPCI surveillance test procedure change intended as corrective action following a May 19, 1995, LPCI inboard injection MOV failure.
- Failure to promptly inspect other LPCI inboard injection MOVs for similar problems following the above failure and the failure of another LPCI inboard injection MOV less than a month later.
- Failure to promptly recognize and provide corrective actions for potential pressure locking of LPCI and CSI inboard injection MOVs.

The licensee's response to the violation was provided to the NRC in a letter dated October 19, 1995 and in a supplemental phone call on November 1, 1995. This response was reviewed and accepted by Region II.

In the current inspection the inspector verified the licensee's completion of corrective actions stated in the response. The only corrective action which had not been performed was the modification of the Unit 1 LPCI and CSI inboard injection MOVs to preclude pressure locking. He verified the licensee's documented plans ("96 UI RFO Outage Information Report", dated October 2, 1995) to modify these valves during the upcoming Unit 1 outage. This was consistent with the licensee's commitment and was determined adequate for NRC closure of the violation.

In his review, the inspector did note that the licensee had experienced further problems with the LPCI inboard injection MOVs, the latest being a stem coupling failure on Unit 2 MOV 2E11F015B. The licensee had modified the Unit 2 LPCI inboard injection MOVs to increase their opening thrust capabilities and had increased the closing thrust settings. The higher setting caused the coupling failure. The setting had been considered acceptable based on a vendor calculation that was subsequently found to be in error. The inspector reviewed records of

dynamic and static diagnostic tests which had been performed on the MOV that failed. This review was performed to verify that the MOV was set and performing satisfactorily for return to operation. He noted that the valve diagnostic trace for the dynamic test appeared more like a static test trace but considered the test results sufficient to demonstrate adequate MOV setting and capabilities. Licensee personnel had no explanation for the appearance of the dynamic test trace.

4.0 Exit Interview

The inspection scope and results were summarized on December 8, 1995, with those persons indicated in Section 1. The inspector described the areas inspected and discussed in detail the inspection results, including the status of the items listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Status</u>	<u>Description and Reference</u>
50-321, 366/95-02-01	Closed	IFI - Determination of Settings for Valves Not Dynamically Tested. (Section 2.1)
50-321, 366/95-02-02	Closed	IFI - MOVs With Marginal Capabilities. (Section 2.2)
50-321, 366/95-02-03	Closed	IFI - Revision to Account for Torque Switch Repeatability. (Section 2.3)
50-321, 366/95-02-04	Closed	IFI - Adequacy of Periodic Verifications and Margin. (Section 2.4)
50-321, 366/95-02-05	Open	IFI - Scope of Valves and Testing. (Section 2.5)
50-321, 366/95-02-06	Closed	IFI - High Packing Load. (Section 3.1)
50-321, 366/95-02-07	Closed	URI - Review of Operability Evaluation for Three Motor Operated Valves. (Section 3.2)
50-321, 366/95-17-01	Closed	VIO - Failure to Provide Prompt Corrective Action to Preclude MOV Failures. (Section 3.3)
50-321, 366/95-25-01	Open	IFI - Valve Factor and Coefficient of Friction Issues. (Section 2.1)

4.0 Acronyms and Initialisms

COF	-	Coefficient of Friction (of valve stem threads)
CSI	-	Core Spray Injection
DCR	-	Design Change Request
EPRI	-	Electric Power Research Institute
GL	-	Generic Letter
IFI	-	Inspector Followup Item
INEL	-	Idaho National Engineering Laboratory
LPCI	-	Low Pressure Coolant Injection
LSB	-	Load Sensitive Behavior
MOV	-	Motor-Operated Valve
NRC	-	Nuclear Regulatory Commission
NRR	-	NRC Office of Nuclear Reactor Regulation
TI	-	Technical Instruction
TSSG	-	Torque Switch Setting Guide
URI	-	Unresolved Item
VF	-	Valve Factor
VIO	-	Violation