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

Report Nos.: 50-424/94-04 and 50-425/94-04

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

Docket Nos.: 50-424 and 50-425 License Nos.: NPF-68 and NPF-81

Facility Name: Vogtle 1 and 2

Inspection Conducted: February 28 to March 4, 1994

Inspector: M D Hunt 3/24/94
M. D. Hunt Date Signed

Accompanying Personnel: M. N. Miller, Reactor Inspector
M. R. Holbrook, INEL
C. Casto, Chief, Test Program Section

Approved by: Charles A Casto 3/25/94
C. A. Casto, Chief Date Signed
Test Programs Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was performed at the Vogtle Nuclear Plant to examine the implementation of the licensee's motor-operated valve (MOV) program to meet commitments in response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." The inspectors utilized the guidance provided in Temporary Instruction (TI) 2515/109 (Part 2), "Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance." As delineated in Part 2 of TI 2515/109, this inspection was the initial review of the Licensee's MOV program implementation in response to GL 89-10.

The inspectors reviewed 10 MOVs in detail including selected portions of design calculations, test packages, and diagnostic signature traces. The inspectors also reviewed followup issues from the previous NRC inspection of the MOV program (TI 2515/109, Part 1) conducted in January 27-31, 1992, and documented in NRC Inspection Report No. 50-424/425/92-01.

Results:

Overall, the licensee was implementing an effective Motor Operated Valve (MOV) Program. The program showed much improvement when compared to the results of the Part 1 inspection. Many of the items noted in the Part 1 inspection were resolved. The inspectors identified an issue concerning the incomplete evaluation of test results before the tested MOVs are returned to service. Specifically, under testing conditions at less than full design differential pressure, testing data was not analyzed to determine whether test acceptance criteria were met. The licensee chose not to conduct a full analysis of the data until several months after returning the MOV to service. This was identified as a violation of Criterion XI of 10 CFR Part 50, Appendix B. In the area of design-basis differential pressure calculations for the auxiliary feedwater MOVs, a disagreement with the pump curves in selecting the operating head (pressure) was identified. This was identified as a unresolved item. The violation and unresolved item are:

VIOLATION (50-424/425/94-04-01), Failure to Adequately Evaluate Test Data.

UNRESOLVED ITEM (50-424/425/94-04-02), AUX FW Pump Head DP Calculations.

Strengths

The licensee has a well trained and knowledgeable MOV staff that reflects a pride of ownership.

The diagnostic traces were well marked, clear, and the staff exhibited a thorough understanding of them.

REPORT DETAILS

1.0 Persons Contacted

Georga Power Company (GPC)

*S. Chestnut, Manager Technical Support
*G. Frederick, Maintenance Manager
*W. Gabbard, Technical Support
*W. Kitchens, Assistant General Manager
*R. Mansfield, Plant Engineering Supervisor-NSSS
*D. Mc Cary, Maintenance Engineering Supervisor
*R. Robinson, Maintenance Engineer
*M. Sheibani, Nuclear Safety & Compliance Supervisor

Southern Nuclear Operating Company (SNC)

*C. Eckert, Safety Assessment & Engineering Review, (SAER)
*J. Petro, SAER
*G. Talton, Project Engineer

Southern Company Services (SCS)

*D. Midlik, Vogtle Support

Other licensee employees contacted during this inspection included engineers, technicians, and administrative personnel.

NRC Personnel

*P. Balmain, Resident Inspector
*R. Starkey, Resident Inspector

*Denotes personnel that attended the exit meeting.

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

2.0 GENERIC LETTER (GL) 89-10 "SAFETY-RELATED MOTOR-OPERATED VALVE [MOV] TESTING AND SURVEILLANCE" (2515/109)

On June 28, 1989, the NRC issued GL 89-10, which requested licensees and construction permit holders to establish a program to ensure that switch settings for safety-related MOVs were selected, set, and maintained properly. Subsequently, six supplements to the GL have been issued. NRC inspections of licensee actions implementing commitments to GL 89-10 and its supplements have been conducted based on guidance provided in Temporary Instruction (TI) 2515/109, "Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance." TI 2515/109 is divided into Part 1, "Program Review," and Part 2, "Verification of Program Implementation."

The TI 2515/109 Part 1 program review was conducted January 27-31, 1992, and was documented in NRC Inspection Report 50-424/92-01.

The purpose of this inspection was to:

1. Review the licensee's corrective actions for the concerns identified during the GL 89-10, Part 1 MOV Inspection and listed in NRC Inspection Report 50-424/425/92-01.

2. Select and review the design-basis and test documentation for several safety related MOVs from a list of tested MOVs within the GL 89-10 program.

The inspectors examined the licensee's implementation of their GL-89-10 Motor Operated Valve Plant Program for diagnostic testing of MOVs. This examination included review of piping and instrumentation drawings; design-basis calculation results of the expected differential pressures; the sizing and switch setting calculations; and diagnostic test data. The inspectors also conducted a walkdown of selected MOVs.

Except as noted and based on the MOVs sampled, the inspectors concluded that the licensee was in the process of implementing an effective program in response to GL 89-10 thereby ensuring the design-basis capability of MOVs at the facility.

2.1 Design-Basis Reviews

The inspectors reviewed the licensee's design-basis documentation (DBD) to determine and verify its adequacy in general for all the MOVs in the program and specifically for the ten sampled MOVs examined during this inspection. In addition, the recommended action "a" of GL 89-10 that requested licensees determine the maximum differential pressure (DP) and flow expected for both normal and abnormal (accident) conditions was reviewed to verify that maximum parameters were used.

This inspection was also a review of the changes implemented to address concerns identified during the January 1992, Part 1, GL 89-10 inspection. That inspection identified several concerns related to design-basis reviews that did not consider worst case fluid flow rate, fluid temperature and ambient temperature conditions. In the electrical area, the effect of high ambient temperatures on electrical cable resistance, motor terminal voltages, and motor torque had not been considered. Review of the cable resistance in the 125 VDC MOV motor terminal voltage calculations, the minimum terminal voltage calculations for 460 VAC motors, and the starting motor torque calculations verified that the high temperature parameter was now incorporated. The elevated temperature effect on motor torque was discussed by Limitorque in their Potential Part 21 Notice dated May 13, 1993 and the Technical Update - 93-03 issued September, 1993.

During this inspection the inspectors reviewed the licensee's design-basis documentation (DBD) for systems of ten selected MOVs. The design-basis documentation examined were referenced and incorporated in the MOV calculations. The licensee had one MOV design-basis differential pressure calculation document that included all the GL 89-10 MOVs. Calculation X4C1000U01, Revision 4 dated October 10, 1992, "Differential Pressure Calculations." The stated purpose was "to document the design-basis for each MOV in the GL 89-10 MOV program and to document the maximum differential pressure and line pressure expected during both opening and closing of the MOV...". The design-basis parameters of fluid flow rate, fluid temperature, and ambient temperature conditions were included in the revised thrust calculations. Calculation X4C1000U02, Revision 4 dated December 24, 1993, "Valve Required Thrust/Torque And Operator Capabilities And Limitations For The GL 89-10 Scope Motor-Operated Valves" included the flow and temperature parameters. X4C1000U02 also included thrust, torque, and the degraded grid voltage values.

The licensee performed the calculations for the derated motor torque at high ambient temperatures as discussed in Limitorque Part 21 Notice. The inspectors verified the reduced torque calculations were completed by reviewing Request for Engineering Assistance REA 93-VAAOU1 dated February 22, 1994. Although the licensee had addressed the reduced torque for the required thrust, the calculated values had not yet been incorporated in X4C1000U02. The licensee stated X4C1000U02 would be revised by the end of April 1994 to include the derated torque values.

The inspectors reviewed one new and two updated electrical calculations for MOV cable sizing and reduced motor starting voltages. These calculations were examined to verify that the effects of temperature were included. The new DC Power Calculation X3CK08-A, "Class 1E Power Cable Sizing," dated May 4, 1993, superseded Calculation X3CK08 for the Class 1E MOV portion. Calculations X3CA19 (Unit 1) and X3CA20 (Unit 2), "Class 1E GL 89-10 MOV Starting Voltages" were updated to include the effects of elevated temperatures on minimum motor starting voltages.

The inspectors verified that the licensee's MOV calculations for differential pressure, electrical degraded grid voltage, flow, temperature, design thrust, and torque addressed the recommendations in GL 89-10. The inspectors verified that degraded grid calculations were included to ensure that the lowest motor terminal voltage commensurate with design-bases conditions was factored into the determination of thrust capability. The inspectors also verified that the licensee satisfactorily addressed the Limitorque Part 21 high temperature motor concern. The MOV documentation was reviewed for the selected valves identified below:

Valve No.	MOV Function, Size, and Type
1-FV-5154	Auxiliary Feedwater Pump P4002 Minimum Flow Isolation Valve 12 inch globe

1-HV-3009	Steam Generator Outlet To Auxiliary Feedwater Turbine Driven Pump Valve 12 inch globe
1-HV-8111A	Centrifugal Charging Pump Minimum Flow Isolation Valve 12 inch globe
1-HV-8801B	Boron Injection Tank Discharge Isolation Valve 4 inch gate
2-HV-5106	Auxiliary Feed Pump Turbine Valve 4 inch gate
2-HV-5122	Auxiliary Feed Pump P4001 Discharge Train C Valve 4 inch globe
2-HV-8106	Charging Line To CVCS Regenerative Heat Exchanger Isolation Valve 3 inch gate
2-HV-8716A	Residual Heat Removal Crosstie Isolation Valve 8 inch gate
2-HV-8813	Safety Injection Common Minimum Flow Isolation Valve 2 inch globe
2-HV-8821B	Safety Injection Pump B To Reactor Coolant System Cold Leg Isolation Valve 4 inch gate

The system documentation reviewed included the Vogtle Plant Manual that contained system design criteria for the Residual Heat Removal System (RHR), the Safety Injection System (SI), the Emergency Core Cooling System (ECCS), and the Auxiliary Feedwater System (AUX FW). The Plant Manual included the system description, operation, and design-basis documentation. In addition, the inspectors reviewed Westinghouse's WCAP 13097, "System Operating Basis For Motor-Operated Valves" that was used as a design-basis document. The Process and Instrumentation (P&ID) drawings and the system Flow Sheet Drawings were also examined. The system flow (P&ID) drawings were used to verify the location of the MOVs in the piping systems and the design safety function. The pump curves for the pumps in each system were examined tc determine the maximum line pressure in the differential pressure calculations. However, the inspectors identified a disagreement with the "operating head" used from the AUX FW pump curves and the "operating head" used in the DP calculations.

The pump operating head assumed in the "Assumptions Section" of differential pressure (DP) calculation X4C1000U01 for the AUX FW System MOVs was in disagreement with the referenced pump curves. In both Units 1 and 2, for MOVs HV-5120, 5122, 5125, 5127, 5132, 5134, 5137, and 5139 an operating pump head of 3500 feet was used for the Aux FW pumps for the maximum DP calculations. For all the MOVs except HV-5120 and 5122, the pump discharge pressure was specified as pump shutoff head. The AUX FW pump(s) flow rate documented in thrust calculation X4C1000U02 was 270 gallons per minute (gpm). The Aux FW pump curves had the shutoff head as 4000 feet. For a flow rate of 270 gpm flow rate the head was 3900 feet. Therefore, the differential pressure calculations for the Aux FW MOVs would be approximately 220 pounds per square inch (psi) higher at a 4000 feet head and 176 psi higher at 3900 feet head than the 3500 feet head used in the DP calculations. For the valves inspected there were no indications that the invalid assumptions would substantially reduce the thrust margins available for these valves. Therefore, the inspectors did not find any operability concerns. These AUX FW pump head disagreements in the DP calculations are identified as Unresolved Item 50-424/425/94-04-02, AUX FW Pump Head DP Calculations Disagreements.

In the areas inspected the inspectors concluded the licensee had adequately implemented the design-basis as recommended in GL 89-10. However, the unresolved item with the Aux FW MOVs still needs to be addressed.

2.2 MOV Sizing and Switch Setting

The inspectors reviewed program document, "Generic Letter 89-10, 'Motor-Operated Valve Testing and Surveillance,' Program Description," dated January 1994, calculation number X4C1000U02, and the licensee's documentation for determination of thrust and torque requirements for the selected valves.

The licensee's gate valve thrust equation incorporated a valve factor of 0.50 for non-Westinghouse, with orifice diameters used for the area term, and vendor-provided disc friction coefficients for Westinghouse gate valves. A valve factor of 1.10 was used for non-Fisher globe valves. Fisher globe valve thrust requirements were provided by the valve vendor. The licensee assumed a stem friction coefficient of 0.15 for determination of actuator output thrust capability. Minimum thrust requirements for setting of actuator torque switches were adjusted to account for diagnostic equipment inaccuracy and torque switch repeatability.

The licensee's thrust calculations did not specify a margin to account for load sensitive behavior in their design basis thrust calculations. Load sensitive behavior (also known as "rate of loading") can reduce the thrust delivered by the motor operator under high differential pressure and flow conditions from the amount delivered under static conditions. A review of the dynamic test evaluations determined that the licensee had implemented a method for determination of load sensitive behavior.

However, the licensee had not developed a position on the margin to be used for those valves that will not be dynamically tested. The licensee will need to resolve this as part of their commitment to have all MOVs statically tested, using best available data, by June 28, 1995.

2.3 Design-Basis Capability

The inspectors reviewed Appendix J, "Guidelines for Reviewing VEGP Generic Letter 89-10 Motor-Operated Valve (MOV) Differential Pressure Test Data," Rev. 1, dated August 29, 1993, Procedure 26866-C, "Dynamic Testing of Motor-Operated Valves Using VOTES Analysis and Test System," Rev. 1, dated February 19, 1993, differential pressure test summary reports, and dynamic test packages for the selected valves.

The inspectors reviewed the selected dynamic test data using an industry standard equation, the valves' orifice diameters, and the dynamic test conditions. The licensee's nominal values were adjusted to account for diagnostic equipment uncertainties. This review indicated closing gate valve factors up to 0.56. Licensee personnel stated that MOVs which have higher than assumed valve factors are considered abnormal and would receive further evaluation, including the possibility of inspecting the valve internals. Although these specific valves had valve factors greater than the assumed valves, there were no indications that the higher valve factors impacted the available thrust margin enough to cause an operability concern.

The licensee's testing identified load sensitive behavior as high as 10.6%. The licensee had not developed a position regarding feedback of specific test results into the tested valve's calculation for those cases where the engineering assumptions were inconsistent with test data. This is important to ensure that design-basis requirements are adequately established when future adjustments are made to the torque switch. If higher than assumed valve factors or stem friction coefficients are found during dynamic test and not corrected in some manner, the licensee will need to revise its design-basis to reflect the actual performance of the MOV under design-basis conditions to ensure that future adjustments are made correctly.

During review of 2HV8716A dynamic test package, the inspectors noted that test procedure 26866-C, "Dynamic Testing of Motor Operated Valves Using VOTES Analysis and Test System," Rev. 1, dated February 19, 1993, did not incorporate the requirements and acceptance limits for determining operability of valves tested at less than design-basis conditions prior to returning the tested MOV to service. Additionally the inspectors noted that MOVs tested in April 1993 were not evaluated for approximately eight months until December 1993. The licensee chose not to evaluate the data because of work load concerns during the outages. However, after the outage of Unit 2, the licensee improved the timeliness of their evaluation. The inspectors identified this as Violation 50-424/425/94-04-01, Failure to Adequately Evaluate Test Data.

During review of 2HV5106, the inspectors noted the use of run efficiency in the actuator closing capability assessment calculation for this DC MOV. Run efficiency reflects the efficiency of a gear train that is at full rotational speed. Limitorque recently stated that use of run efficiency is not appropriate for DC motors due to their sensitivity to load that makes it difficult to predict when the actuator's efficiency transitions from a run efficiency to a pullout (lower) efficiency. 2HV5106 was found to have inadequate capability to open the torque switch when considering the use of pullout efficiency for the closing direction under degraded voltage conditions. In an effort to resolve the concerns associated with 2HV5106, licensee personnel were reviewing the degraded voltage requirements for this valve. Additional information is expected to be issued by Limitorque regarding this issue. The licensee response to the vendor information will be reviewed during a subsequent inspection.

During review of Appendix J, "Guidelines for Reviewing VEGP Generic Letter 89-10 Motor-Operated Valve (MOV) Differential Pressure Test Data," it was noted that the diagnostic equipment inaccuracies and the torque switch repeatability values were carried as a plus or minus number through the engineering evaluations. This resulted in the determination of a percent margin, plus/minus a given percent. The final step asked the evaluator if the percent margin was greater than zero. The data evaluation procedure did not clearly instruct the evaluator to subtract the percentage assigned for diagnostic uncertainties from the calculated margin prior to comparing the result to zero. The differential pressure test summary report for 2HV8716A indicated that this valve had a margin of 27% when the evaluation determined that the margin was 27% $\pm$ 13.9%. Therefore, the real margin was 13.1%. Licensee personnel agreed that this was misleading and planned to revise their procedures to ensure that appropriate evaluation of margin is performed during the engineering evaluations. The inspectors will review the licensee's resolution of this issue during future inspections.

The licensee was not evaluating the impact of stem friction coefficient data from their dynamic testing when the torque output at flow isolation was insufficient to overcome spring pack pre-load. In these situations, the stem friction was measured at torque switch trip. If the measured value was greater than the assumed value of 0.15 (and the data was not measured at flow isolation), the engineering evaluations indicated that the friction values were "for information only." While the flow isolation point of the valve stroke is the best point to evaluate, stem friction coefficients available at torque switch trip may constitute "best available data," and should be reviewed for impact on actuator capability. The inspectors noted that the three MOVs in Group XII all had dynamic stem friction coefficients in excess of 0.20 and were good examples of valves that require review. While the stem friction coefficient for the valves exceed the 0.15 assumption, enough thrust margin existed to ensure valve operability. Valve No. 2HV5106 was a member of this group. Of further concern, the inspectors noted that the

summary report, "1R4 & 2R3 Motor-Operated Valve (MOV) Differential Pressure Test Evaluations," transmitted by cover letter from C. C. Miller, Project Design Manager - Vogtle, to C. R. Myer, Jr., dated January 14, 1994, did not consider diagnostic equipment uncertainties when identifying stem friction coefficients. When the measured stem friction coefficient (including consideration of diagnostic uncertainties) exceeds the assumed stem friction coefficient value, the upper allowable range of acceptable torque switch setting is affected and therefore should be evaluated.

To determine the operability of an MOV, the licensee linearly extrapolates the thrust necessary to overcome differential pressure to design basis conditions. This was done by determining the apparent valve factor based on the dynamic test conditions and then using this valve factor to recalculate the minimum thrust requirements at design basis conditions. Until the licensee develops a justification for their extrapolation method, the inspectors consider the licensee's extrapolation to be the first stage of a two stage approach, where the valves are setup using the best available data, as discussed in GL 89-10. The licensee would be expected to justify its method of extrapolation by the schedule commitment date for the completion of their GL 89-10 program.

The licensee had not developed a method for comparing dynamic test results for Fisher globe valves to the thrust requirements information provided by the valve vendor. Licensee personnel stated that they were working with the vendor to resolve this issue. The inspectors will review the licensee's resolution of this issue during future inspections.

2.4 Periodic Verification of MOV Capability

Recommended action "d" of the generic letter requests the preparation or revision of procedures to ensure that adequate MOV switch settings are determined and maintained throughout the life of the plant. Section "j" of the generic letter recommends surveillance to confirm the adequacy of the settings. The interval of the surveillance was to be based on the safety importance of the MOV as well as its maintenance and performance history, but was recommended not to exceed five years or three refueling outages. Further, GL 89-10 recommended that the capability of the MOV be verified if the MOV was replaced, modified, or overhauled to an extent that the existing test results are not representative of the MOV.

The program calls for diagnostic testing to be conducted after the performance of preventive maintenance to document the "as left" condition. The MOV PMs are performed on a 36 month interval. During outages when only the diagnostic testing is scheduled, the "as found" condition will be recorded and will also account for the "as left" condition. The diagnostic (static) tests are scheduled every 5 years. The licensee informed the inspectors that if the PM and Test are scheduled the PM will be performed and then the diagnostic testing will be completed. It is the licensee's belief that to perform diagnostic

testing prior to all PMs would result in additional wear and tear on the valve, unnecessary personnel exposure and increased maintenance costs without substantial benefits. While this might be an acceptable practice, for GL 89-10 closeout, the licensee will need to justify this assumption over the entire lubrication interval.

The inspectors reviewed the PM procedure and the work planning desktop instruction which were the two documents that control any activities that relate to MOV maintenance. The procedure requires an internal inspection of the actuator with the replacement of grease as well as inspection of the gears, limit switches, and torque switch. The desktop instruction directs the testing required in accordance with the maintenance performed.

Based on the maintenance procedures reviewed and discussions with the personnel responsible for maintaining the MOVs, the inspectors concluded that proper tests are required and if conducted and documented after maintenance activities are completed the intent of GL 89-10 will be met.

The licensee's program required that static testing would be used to periodically reverify the design basis capability of MOVs in their GL program. The use of static testing to verify continued capability of an MOV to operate under worst case differential pressure and flow conditions is still being evaluated by NRC. In view of the program plan for reverification tests, the licensee should maintain the testing documentation and any other records that they feel supports static testing as a means for reverification. The inspectors will review this issue during a future inspection.

2.5 MOV Failures, Corrective Actions, and Trending

Recommended action "h" of the generic letter requests that licensees analyze and justify each MOV failure and corrective action. The documentation should include the results and history of each as-found deteriorated condition, malfunction, test, inspection, analysis, repair, or alteration. All documentation should be retained and reported in accordance with plant requirements. It is also suggested that the material be periodically examined (every two years or after each refueling outage after program implementation) as part of the monitoring and feedback effort to establish trends of MOV operability.

The inspectors examined the corrective action and trending programs. there were no valve failures therefore no corrective actions were necessary. One valve had a abnormal diagnostic trace that indicated a problem with the valve packing. The licensee made repairs on this valve and continues to observe the valve's performance. There was no concern over valve operability. No problems were noted by the inspectors for the corrective action program. Further inspection in both the corrective action and trending programs will be necessary until completion of all valve testing.

2.6 Schedule

In GL 89-10, the NRC staff requested that licensees complete all design-basis reviews, analyses, verifications, tests, and inspections that were initiated in order to satisfy the generic letter recommendations by June 28, 1994, or three refueling outages after December 28, 1989, whichever is later. The NRC's December 23, 1992, letter granted Georgia Power Company a one year extension with the completion date of June 28, 1995. At this time, the licensee is on schedule to meet the 1995 commitment.

2.7 Pressure Locking and Thermal Binding

The Office for Analysis and Evaluation of Operational Data (AEOD) has completed a study of pressure locking and thermal binding of gate valves. AEOD concluded in its report that licensees have not taken sufficient action to provide assurance that pressure locking and thermal binding will not prevent a gate valve from performing its safety function. In GL 89-10, the staff requested licensees to review the design basis of their safety-related MOVs. The licensee had identified those valves that had a potential to be susceptible to either pressure locking or thermal binding. Those valves were evaluated and appropriate preventive measures, such as physical modifications and operational procedure changes, were taken to preclude MOV failures of this nature.

While the licensee has undertaken significant action in this area, more industry information is expected to be provided on pressure locking and thermal binding. In addition, the NRC is expected to promulgate more information in this area. Therefore, this issue will remain open pending further inspection.

2.8 Walkdown

A walkdown inspection of selected MOVs was conducted by the inspectors to observe the installed yoke sensors and the condition of the valve stems. For all the MOVs examined, the valve stems were in good condition and lubricated. The MOVs were also examined to verify that the yoke sensors (VOTES-strain gage sensor) were installed on the valves. Yoke sensors were used since there was not enough room for stem sensors. The yoke sensors were examined to determine their general condition including the installed location and wiring connections. The yoke sensors were in good condition and properly installed.

2.9 Followup of Concerns Enumerated in the Part 1 Followup Report

During the part I inspection conducted January 6-10, 1992, concerns involving the adequacy of the licensee's assumptions and methods in certain areas of their MOV program were identified. There were certain technological uncertainties existing that could effect the predictabilities of MOV characteristics. The concerns are discussed below.

(Written response requested at the end of the inspection.)

1. Progress and near term plans for implementing the MOV program were limited.

2. The licensee has not identified/documented those MOVs that will be tested under design-basis conditions.

3. The licensee had not developed procedures for implementing the two stage approach.

The licensee submitted a written response to these concerns in a GPC letter dated July 9, 1992. The information submitted contained a review of the licensee's actions up to that date as well as actions that would be taken in the future. During this inspection the inspectors concluded that the licensee has now developed and is implementing a suitable MOV program to meet the intent of GL 89-10. This included modifications to 54 MOVs, listing by priority the MOVs to be DP tested including the valves that were tested in response to I&E Bulletin 85-03, and the development of testing procedures that address stage 1 of the two stage approach.

(No written response requested)

4. The licensee will need to justify that the present periodic test methodology will demonstrate operability at design-basis conditions.

   The concern is discussed in Section 2.4 of this report and remains open pending more inspection.

5. The design-basis reviews have not considered worst case fluid flow rate, fluid temperature nor ambient temperature as recommended by GL 89-10.

   The concern is discussed in Section 2.1 of this report and was satisfactorily resolved.

6. Procedures do not require that "as found" periodic diagnostic testing be conducted prior to performing preventive maintenance.

   This concern is discussed in Section 2.4 of this report. The licensee's plan to perform "as found" tests every 3rd outage is consistent with the GL 89-10 recommendation.

7. The licensee is using stem coefficients of 0.15 for MOV sizing calculations.

   The licensee has tested ten Unit 2 MOVs using the MOVATS Torque-Thrust cell before stem lubrication (after 36 months

of service) and compared the results to tests performed after stem lubrication. The average "as found" stem friction coefficient was 0.1120. After stem lubrication the friction coefficient was 0.1174. The majority of the measurements were taken at torque switch trip under both static and dynamic conditions. The licensee prefers to use flow isolation as the measurement point, however, due to their choice of diagnostic equipment, using flow isolation is somewhat limited. Based on these findings the stem lubricant did not appear to degrade over the 36 month

period. Based on this data the use of a stem friction factor of 0.15 would appear to be acceptable.

8. The licensee took exception to GL 89-10 recommendation regarding mispositioning of MOVs in their December 27, 1989, letter.

   The mispositioning differential pressures were included in the design-basis DP calculations. GPC has determined that if NRC deletes the provision for MOVs to recover from mispositioning the calculations will be revised accordingly.

9. The licensee has not evaluated the rate-of-loading effects into MOV sizing and switch setting calculations. Instrument accuracies and torque switch repeatability need to be addressed in the setpoint documents for diagnostic testing.

   Test equipment accuracy and torque switch repeatability have been incorporated into the site diagnostic test procedures.

10. The MOV program does not specify the acceptance criteria, nor require the review or evaluation of test results to ensure MOV operability had been addressed prior to returning an MOV to operation.

    At the time of the Part 1 inspection no DP test procedure had been developed. The procedure for DP testing was reviewed during this inspection and it was determined that there was no acceptance criteria for testing of valves at partial DPs. This condition is discussed further in Section 2.3 of this report.

11. The effects of high ambient accident temperatures on motor torque, if any had not been accounted for in the licensee's calculations.

    This concern is discussed in Section 2.1 of this report and was satisfactorily resolved.

12. The MOV Users Group validation committee is preparing to issue a report on diagnostic system accuracies.

The licensee has the necessary information to account for the diagnostic system inaccuracies.

13. The effect of ambient temperature above 90°C on cable resistance had not been considered in calculating the MOV terminal voltages.

    This concern is discussed in Section 2.1 of this report. The effects of elevated temperatures on cables has been included in the degraded voltage calculation.

14. The MOV Program does not provide a feed back mechanism to ensure that differential-flow test results are reviewed for reconciliation of MOV switch setting calculations as testing under DP conditions can effect stem factor, valve factor and other factors.

    This concern is discussed in Section 2.3 of this report.

15. The review and incorporation of the methodology for determining valve Thrust/Torque requirements and operator capabilities are incomplete at the current stage of the MOV program.

    This concern has now been satisfactorily resolved as was determined by the inspectors review of the licensee's MOV program.

16. The MOV program documents, Vogtle Program Description and Site MOV Program Manual lack well defined areas of responsibilities and have inconsistencies between the documents.

    The MOV program for Vogtle and the Corporate program now have clear lines of responsibilities identified.

3. EXIT INTERVIEW

The inspection scope and findings were summarized on March 4, 1994, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. One Violation and one unresolved item were identified in the area of dynamic testing of MOVs at partial differential pressure. The inspectors informed the licensee that consideration had been given to the fact that no MOVs were identified that required adjustment after the reconciliation evaluation. The licensee disagreed with the violation. (See the discussion in Section 2.3.) Licensee management took exception to the violation based on: (1) unclear regulatory guidance; (2) extensive corrective actions taken earlier by the licensee on potentially troublesome valve actuators; (3) their use of a new diagnostic system that took time for

training; and (4) there were no valve failures, nor did the data show any significant valve problems.

4. ACRONYMS AND INITIALISMS

AEOD	Office for Analysis & Evaluation of Operational Data
AUX FW	Auxiliary Feedwater
CS	Charging System
CST	Control Switch Trip
DBD	Design Basis Document
DC	Direct Current
DP	Differential Pressure
EPRI	Electric Power Research Institute
FSAR	Final Safety Analysis Report
GL	Generic Letter
GPC	Georga Power Company
IFI	Inspector Followup Item
LB	Pound
MOV	Motor Operated Valve
MS	Main Steam System
NRC	Nuclear Regulatory Commission
NRR	Nuclear Reactor Regulation
PSID	Pounds Per Square Inch Differential
RHR	Residual Heat Removal System
ROL	Rate of Loading
SCS	Southern Company Services
SI	Safety Injection
SNC	Southern Nuclear Operating Company
V	Volts
VEGP	Vogtle Electric Generating Plant
VOTES	Valve Operation Test and Evaluation System