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

Report Nos.: 50-413/94-05 and 50-414/94-05

Licensee: Duke Power Company
422 South Church Street
Charlotte, NC 28242

Docket Nos.: 50-413 and 50-414 License Nos.: NPF-35 and NPF-52

Facility Name: Catawba 1 and 2

Inspection Conducted: January 24-28, 1994

Inspector: E H Girard for 2/25/94
M. D. Hunt Date Signed

Accompanying Inspector: E. H. Girard

Approved by: Charles J Casto 2/25/94
C. Casto, Chief Date Signed
Test Programs Section
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope:

This special, announced inspection was performed at the Catawba 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 selected portions of design calculations, test packages, and diagnostic signature traces for seven MOVs. The inspectors also reviewed the licensee's corrective actions taken for deficiencies identified during testing and entered into the Problem Investigation Process.

Results:

The licensee had not implemented a commitment for a periodic trending program report in accordance with GL 89-10 recommendation "h". This was identified as an unresolved item. (Section 2.4.b)

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*B. Bright, Mechanical/Civil Engineering Manager
*T. Edwards, Engineering Supervisor
*N. Estep, Senior Engineer
*J. Forbes, Engineering Manager
*C. Helmers, Component Engineer
*H. Henkel, Senior Engineer
*W. McCollum, Station Manager
*K. Nicholson, Compliance Technical Assistant
*Z. Taylor, Compliance Manager
*D. Ward, Mechanical/Nuclear Engineering
*R. Winn, Components, Technical Specialist

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

NRC Resident Inspector

*R. Freudenberger, Senior Resident Inspector
P. Hopkins, Resident Inspector
J. Zieler, Resident Inspector

*Attended exit interview

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

2. GENERIC LETTER (GL) 89-10 "SAFETY-RELATED MOTOR-OPERATED VALVE [MOV] TESTING AND SURVEILLANCE" (TI-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, five supplements to the GL have been issued and one issued for comment. 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."

2.1 Design-Basis Reviews

The inspectors reviewed the licensee's design-basis documentation for the sampled MOVs to verify that the design-basis differential pressure and flow conditions, design temperature, and other design parameters for each MOV selected were correctly determined in accordance with the

recommendations of GL 89-10. This included verification that the maximum differential pressure and flow expected for both normal and abnormal (accident) conditions had been determined.

The selected sample of MOVs, their functions, and the associated design-basis and setting calculation documents were as follows:

Valve	Function	Size and Type	Actuator	Design-Basis Calc.	Thrust/ Torque Calc.
1CA043B	AFW Pump Discharge Isolation Valve to SG D	4" Gate	Rotork	CNC-1223.42-00-0030	CNC-1205.19-00-0029
2CA058A	AFW Pump Discharge Isolation Valve to SG B	4" Gate	Rotork	CNC-1223.42-00-0031	CNC-1205.19-00-0029
1KC001A	KC Aux. Bldg. Nonessential Header Return Isolation Valve to "A" KC Pumps	20" Butterfly	Limitorque	CNC-1223.23-00-0043	None (Limit Seated)
1NI162A	Cold Leg Injection Valve.	4" Gate	Rotork	CNC-1223.12-00-0042	CNC-1205.19-00-0019
2NI150B	Hot Leg Injection Containment Isolation valve	4" Gate	Rotork	CNC-1223.12-00-0035	CNC-1205.19-00-0018
1NV37A	Aux Pressurizer Spray Header Isolation Valve	2" Globe	Rotork	CNC-1223.04-00-0052	CNC-1205.19-00-0023
1NI183B	Hot Leg Injection Containment Isolation Valve	12" Gate	Limitorque	CNC-1223.12-00-0046	MOV Thrust spreadsheet

The valves selected were primarily MOVs that operated at high differential pressure and required higher thrust values. The other intent was to review both gate, globe, and butterfly valve testing. Opening of all of the valves was controlled by limit switch. Closing was controlled by torque switch except in the case of the butterfly valve, which was controlled by limit switch.

In the areas inspected the inspectors concluded the licensee had adequately determined the design-basis as recommended in GL 89-10.

2.2 MOV Sizing and Switch Setting

The above listed thrust/torque calculations computed the thrust setting and torque values for the selected sample of MOVs at design-basis differential pressure conditions. The inspectors found that the calculations used standard industry equations and applications factors. The gate valve thrust equation incorporated a valve factor of 0.60 for Westinghouse gate valves and a valve factor of 0.50 for the other gate valves. A 10 percent margin was used to account for uncertainties in rate of loading and a 5 percent margin was applied for other uncertainties. A stem friction coefficient of 0.15 was assumed in determining torque from thrust. The inspectors independently verified the accuracy of the thrust and torque calculations and that structural and motor torque capabilities were not exceeded. The accuracy of degraded voltage values used was not checked but will be examined in a subsequent GL 89-10 inspection.

The inspectors questioned whether the margin added adequately accounted for thrust measurement error. They were informed that an adjustment was made at setup for recent tests and in the analyses of all post test results. The inspectors verified the documented values of this adjustment given in the test packages. For example, in the case of valve 1CA42B the set-up margin was increased by 5 percent (to 20 percent total margin).

Subsequent to differential pressure testing the licensee calculated revised valve factors based on the test results for use in future switch setting calculations.

No concerns were identified during this portion of the review. As noted above, the accuracy of degraded voltage values will be verified in a subsequent inspection.

2.3 Design-Basis Capability

The inspectors reviewed the differential pressure test results and post test analysis for each valve in the selected sample. This review was conducted to verify that design-basis capabilities were demonstrated. The review included diagnostic test data, pressure and flow measurements, and documentation and analyses of the results on a licensee computer generated spreadsheet. The inspectors found that the testing and analyses demonstrated adequate design-basis capabilities. Except in the case of the butterfly valve, the inspectors based this conclusion on both operational and diagnostic test results. Because of their uncertainty regarding diagnostic accuracies for the butterfly valve test, the inspectors based their above conclusion primarily on the successful valve operation at design-basis differential pressure. The motor capability and structural limits for the butterfly valve were documented as having substantial margins at required torque.

A small discrepancy was identified by the inspectors in the licensee's determination of the differential pressure used in the test on valve 1CA42B. The surveillance procedure used to test the valve, PT/1/A/4200/13E, recorded a discharge pressure (upstream) of 1800 psig, downstream pressure of 0 psig, and calculated differential pressure of 1800 psig. However, the licensee's post test analysis used a differential pressure of 1780 psig. Licensee personnel stated their belief that the values used in the analysis were correct. The inspectors could not verify with certainty which was correct. However, the maximum design-basis pressure for the valve was 1643 psig and structural margins were large. Therefore, the difference between using 1800 and 1780 was not significant. A review of documentation for other valves did not reveal any other differences between the pressures recorded in surveillance procedures and the pressures used in post test analyses.

As stated above, the inspectors concluded that the licensee demonstrated the capabilities of the selected valves at design-basis conditions.

2.4 MOV Failures, Corrective Actions, and Trending

Recommended action "h" of the generic letter requests that licensees analyze or justify and document 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 licensee's analysis and resolution of selected examples of MOV problems and the periodic examination of failures and degraded conditions recommended by GL 89-10.

a. Analysis and Resolution of Selected Examples of MOV Problems

The inspectors reviewed four MOV related problems entered into the licensee's Problem Investigation Process (PIP). These are discussed below.

PIP Serial No.	Problem Description/Resolution
O-C89-0007	Significant Event Report 87-20 and Limitorque Maintenance Update 88-2 addressed the potential problem of spring pack hydraulic lock-up. The corrective actions included installation of the latest anti-hydraulic lock spring packs in conjunction with the GL 89-10 program.

0-C91-0306	Limitorque Potential 10 CFR 21 regarding the potential for damage of torque switch roll pins when declutching actuators while torqued out. The corrective action was to install improved design torque switches in the affected MOVs and replace the spare torque switches in stock with the new design.
0-C93-0003	Limitorque Actuators may disengage during a seismic event. A review and calculation CNC 1205.19-00-0031, Seismic Excitation of Manual Lever Arms for the affected MOVs determined that based on the length of the seismic event (20 sec.) the only result would be a delay of that time for valve operation.
0-C93-00391	MOV non-vertical stem orientation problems. NRC Information Notice 92-59. The corrective actions included review of maintenance and operations history for valves with this orientation, initiate corrective action when concerns are identified, and review the differential pressure test results to see if non-vertical stem oriented valves behave differently.

The corrective actions recommended and taken for each PIP were reviewed and found to be acceptable. Each of the PIPs had adequate justifications to support the actions taken.

b. Periodic Examination of Failures and Degraded Conditions

The licensee's letter of response to GL 89-10, dated December 28, 1989, stated that valid failures would be subject to the documentation and trending requirements recommended by GL 89-10. In prescribing implementation of this commitment, the Duke Power Company NRC Generic Letter 89-10 Program (10/30/92) specified that a trending program report and analysis must be produced on a frequency of one Refueling Outage or two years per GL 89-10 recommendation "h". The results were to be used to influence the frequency of periodic surveillance testing and preventive maintenance per GL 89-10 recommendation "j". The Program also stated that the trending report could be prepared annually to coincide with the required annual Rotork actuator review.

The inspectors requested a copy of the latest trending report prepared to meet the commitment for periodic failure trending. They were informed that no report had been prepared for MOVs with Limitorque actuators. The inspectors examined the latest report for valves with Rotork actuators and found that it did not provide any information or conclusions in relation to GL 89-10.

Additionally, although the Rotork report covered corrective maintenance for the 1992 calendar year, it had not been issued until September 22, 1993.

The licensee's failure to implement the documented periodic failure trending and analysis in accordance with their commitment is identified as unresolved item 50-413, 414/94-05-01, No Periodic GL 89-10 Failure Trending and Analysis for MOVs. NRC Region II will reexamine this item to verify that the commitment is implemented in accordance with the schedule for completion of design-basis testing and analyses.

3. EXIT INTERVIEW

The inspection scope and findings were summarized on January 28, 1994, with those persons indicated in Section 1. The inspectors described the areas inspected and discussed in detail the inspection results. Proprietary information is not contained in this report. No dissenting comments were received from the licensee. One unresolved item was identified.

Item Number	Status	Title and Reference
413/94-05-01 414/94-05-01	Open	Unresolved Item - No Periodic GL 89-10 Failure Trending and Analysis for MOVs. (Section 2.4.b)

4. ACRONYMS AND INITIALISMS

AFW	Auxiliary Feedwater
GL	Generic Letter
KC	Component Cooling
MOV	Motor Operated Valve
NRC	Nuclear Regulatory Commission
PIP	Problem Investigation Process
psig	Pounds per Square Inch Gage
SG	Steam Generator
TI	Temporary Instruction