U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/DOCKET NO.	50-333/94-02
LICENSE NO.	DPR-59
LICENSEE:	New York Power Authority (NYPA) P.O. Box 41 Lycoming, New York 13093
FACILITY:	James A. FitzPatrick Nuclear Power Plant
LOCATION:	Scriba, New York
INSPECTION DATES:	February 7-11, 1994
INSPECTORS:	R. S. Cain, INEL

Thomas J. Kenny, Sr. Reactor Engineer
Systems Section, EB, DRS

3/31/94
Date

APPROVED BY:

Marvin W. Hodges

Dr. Plackeel K. Eapen, Chief
Systems Section, EB, DRS

3/31/94
Date

EXECUTIVE SUMMARY

The inspectors reviewed changes and enhancements that were made to the FitzPatrick Generic Letter 89-10 program and noted the following.

Many of the incomplete items from the team inspection were addressed (Section 2.0). However, weak link analysis, rate of loading and bounding temperatures for dynamic testing have not been determined. Static and dynamic testing appear to be behind schedule, and it appears that the program will not be completed within the time allotted by GL 89-10 (Sections 2.0 and 6.0). One unresolved item regarding dc powered MOV stroke times was resolved.

Pressure locking and thermal binding of MOV gate valves have been addressed very well with modifications in place to prevent the problems from occurring (Section 4.0).

The verification of program implementation was addressed during this inspection. However, due to the limited number of valves that have been tested, the program feedback mechanism could not be effectively assessed (Section 5.0).

DETAILS

1.0 INTRODUCTION

On February 1-5, 1993, a team inspection was conducted to evaluate the adequacy of New York Power Authority's (NYPA's) actions, in response to NRC Generic Letter (GL) 89-10 "Safety-Related Motor-Operated Valve Testing and Surveillance," and its Supplements. NRC Inspection Report No. 50-333/93-80 documented the findings of that inspection. The team concluded that NYPA's implementation of the program, with few exceptions was addressing the recommended actions of GL 89-10. The issues requiring additional action were listed in Table 1 of Report No. 50-333/93-80.

2.0 UPDATE OF TABLE 1 STATUS OF PREVIOUSLY IDENTIFIED ISSUES IN THE MOV AREA

This section provides a status of the open issues from the team inspection. Each open item is denoted with • and the status is provided in the paragraph that follows the open item.

2.1 Scope and Administration of the Program

- NYPA was to implement corrective actions concerning Adverse Quality Condition Report 93-012 to resolve MOV selection review concerns (Closed).

  NYPA has reviewed all administrative and emergency operating procedures, technical specifications (TS) and the team inspection comments and determined that one of the team identified valves and 8 of NYPA identified valves were not warranted to be in the program. NYPA closed Adverse Quality Condition Report 93-012; the actions taken by NYPA were consistent with the guidelines of GL 89-10. The inspector reviewed NYPA's actions regarding MOV selection and has no further questions.

- NYPA was to provide the necessary administrative controls in the MOV program to justify the exclusion of any MOV's (Closed).

  NYPA has rewritten the "Generic Letter 89-10 MOV Program Plan" (hereafter known as the Plan), and has added a section for the de-selection of a valve from the program. Revision 6 of the Plan delineates the justification, the rationale, and the responsible personnel that must concur in order to remove a valve from the program. These actions were consistent with the guidelines of GL 89-10.

- NYPA was to revise Project Procedure NYP-830-003 to set priorities for the remaining MOV work (Closed).

The inspector reviewed the Plan and noted that the prioritization section has been added as Appendix "C", that prioritizes MOVs in accordance with the following established guidelines.

- The highest priority are the valves (20 total) that would contribute to 95% of core damage frequency. The valves are identified and ranked in order.

- High energy line break MOVs are the next highest priority and are ranked according to valve type, function, operational requirement, fluid conditions pressure range and environment.

- The remaining valves are listed in order of decreasing rank by valve number.

All valves in the program have been prioritized by using the above guidelines.

- NYPA was to develop a system to track completion of all MOV program elements (Closed).

NYPA has developed a computerized method of effectively tracking the MOV program.

2.2 Design-Basis Reviews

- NYPA agreed to review the design-basis review packages to ensure that fluid flow rate and temperature were bounded and documented consistently (Open).

The design flow rates for the MOVs in the program have been established and are available for use; however, NYPA has not established the bounding temperatures. (Please see Section 5.0 below for additional discussion.)

- NYPA agreed to complete the evaluation of the impact of degraded voltage conditions on dc powered MOV stroke times (URI 50-333/93-80-001) (Closed).

NYPA has completed the evaluation and has identified several valves outside of TS timing requirements in a degraded voltage condition. Each of the dc powered safety-related valves had a safety evaluation that identified the specific time at which the valve was required to operate in the sequence of events and the voltage available at that time of operation. Battery voltage decreases from the beginning of the event to the end. The stroke times for several valves exceeds the technical specification requirements between 1 and 4 seconds. The safety evaluations performed by NYPA showed that each valve would perform its intended function during the worst case scenario, considering both time and voltage requirements. The inspector considers this item closed.

- NYPA agreed to incorporate the results of ac motor capability studies concerning the impact of ambient temperature affects when available (Closed).

  NYPA was completing an evaluation of the effects of Limitorque's Potential 10 CFR 21 condition, "Reliance 3 phase L. C. Actuator Motors (Starting Torque at Elevated Temperatures)," dated May 13, 1993, which dealt with the effect of elevated temperature on the output of ac motors. Preliminary results identified 6 MOVs that may have to operate under elevated temperatures. Engineering evaluated the safety function of each MOV and determined when the MOV was required to operate. Engineering also established possible ambient temperature during this operation. Five of the six MOVs were concluded to have sufficient torque at the operating temperature. One MOV, 12MOV-15, reactor water clean up supply inboard isolation valve required further evaluation. Preliminary results reviewed by the inspector indicated that this valve would also have sufficient torque to operate.

2.3 MOV Switch Settings and Setpoint Control

- NYPA agreed to revise the valve factor values for parallel disc gate valves in EDP-33 from 0.2 to 0.3 to be consistent with current assumptions in the thrust equation for this type of valve (Closed).

  The inspectors reviewed NYPA's procedure for MOV sizing and switch setting, EDP-33, "Sizing Of Motor-Operated Valve Actuators," and MP-59.36, "Baseline Testing of Limitorque Valves Using VOTES." NYPA's gate valve thrust equation typically incorporated a valve factor of 0.30 for rising stem wedge gate valves and 0.10 for globe valves.

- NYPA agreed to implement a formal feedback mechanism into the program for validating assumptions on MOV thrust calculations (Open).

  The formal feedback mechanism has been incorporated into the Plan; however, the auditability of actual feedback could not be assessed because there has not been enough testing accomplished to date.

- NYPA agreed to analyze for load sensitive behavior in MOV thrust calculations and test results (Open).

  NYPA had a draft corporate position on "Rate of Loading (ROL)/Load Sensitive Behavior," DOC-94-39, dated February 3, 1994. The inspectors were concerned that the ROL document was still in draft status. The 5 year period or 3 refueling outages, whichever is greater, for the completion of the GL 89-10 program is almost complete. NYPA's position on ROL required feedback from the differential pressure (d/p) testing. Since NYPA did not have much data from their d/p testing, the inspectors felt that the inclusion of ROL would be delayed. With the need to perform more d/p

testing and collect data, the inspectors felt that NYPA will not meet the required completion date for their GL 89-10 program. The inspectors considered this an open item to be reviewed during a future inspection.

- NYPA stated that the current thrust settings for 10MOV-39A would be reviewed (Closed).

  The inspector reviewed Engineering Evaluation JMD-93-293 that found 10MOV-39A acceptable. The inspector has no further questions.

- NYPA agreed to verify the basis for all assumptions used in the evaluations regarding the potential failure of certain MOVs subject to severe degraded voltage conditions during a postulated DBA and LOOP scenario (URI 50-333/93-80-002) (Open).

  This item remains open pending the final review of NYPA's evaluation of 12 MOV 15 supply inboard isolation valve. For more details see Section 5.2.

2.5 Pressure Locking

- NYPA was to provide the requested information to the NRC regarding assumptions in the Failure Prevention, Inc. analysis that was used as a basis for not modifying two MOVs potentially subject to failure due to bonnet pressure locking (URI 50-333/93-80-003) (Closed).

  NYPA provided the requested information that the inspectors found acceptable. See Section 4.0 for additional information.

2.6 MOV Testing

- NYPA agreed to provide formal guidance for the use of the Kalsi report regarding MOV thrust criteria. This guidance was to be issued and the program revised by May 1, 1993 (Closed).

  The Plan has been revised to provide formal guidance for the use of the Kalsi report regarding MOV thrust criteria. Several calculations were reviewed by the inspectors that utilized the Kalsi methods to determine overthrust. During the team inspection, NYPA was asked to provide formal guidance for the use of the Kalsi report regarding MOV thrust criteria. NYPA has adopted the Kalsi study and become one of its users. In particular, the Kalsi study was used to address the Liberty 10 CFR Part 21 notification of changes in stem material data and the application of a torque correction factor (TCF). NYPA performed a review of their MOVs for the application of TCF. NYPA found 18 valves overthrusting. One valve exceeded the Kalsi overthrust value and was replaced. Two valves were over 140% but less than the 162% overthrust. These two valves, 10MOV-12A and 10MOV-12B are scheduled to be overhauled.

The remaining valves that were considered to be overthrusting have been dispositioned using the Kalsi study. Operability considerations were made in accordance with NYP-830-004, "Operating Condition Evaluation." This document and the existing operability/reportability administrative documents are NYPA's mechanism for evaluating operability. The inspector found this method to be consistent with the requirements of the applicable 10 CFR 50 sections.

- NYPA agreed to provide the necessary procedures and program changes for the short term evaluation of dynamic test results prior to the return of an MOV to service. This would include extrapolation of partial differential pressure data to design-basis conditions. Similar changes would be made to define the requirements for a long term devaluation of dynamic test results, including such considerations as valve factor, stem friction coefficient and available margin. The program was to be changed by April 1, 1993 (Open).

  The Plan has been revised to address the above concerns prior to returning an MOV to service after dynamic testing. To determine the immediate operability of an MOV, prior to returning the valve to service, NYPA uses an "adjusted required thrust," based on a ratio of test d/p to design basis d/p. If the MOV passed this test along with other criteria, the MOV was returned to service, and final valve factor calculations and other analysis were completed later. However, if the MOV did not pass this initial screening test, Valve factor, stem friction coefficient, etc., was calculated immediately to see if the valve had any margin of thrust, and what would be required prior to returning the valve to service. NYPA stated that extrapolations would be performed for testing conducted at 80% (and higher) of design basis conditions. Until further testing in the industry or testing by NYPA validates their extrapolation methodology, the inspectors considered NYPA's extrapolation the first stage of a two stage approach, where the valves are setup using the best available data, as discussed in GL 89-10. Justification of this method of extrapolation through testing or from industry data by the scheduled completion date for their program is one of the guidelines provided in GL 89-10.

- NYPA agreed to retest 46MOV-102B, 10MOV-66B and possibly 10MOV-66A (Open).

  These valves are scheduled for retesting in April and December 1994.

- NYPA agreed to define their methodology for the 2-stage approach in establishing the switch settings for certain MOVs. The program was to be revised by April 1, 1993 (Open).

The Plan now defines the methodology for the 2-stage approach in establishing the switch settings for certain MOVs. The first stage approach used by NYPA is based on those described in GL 89-10, "Tabulation of Detailed Evaluations of Flow/dp Tests." This methodology is based on the industry practice of linear extrapolation of data obtained from less than 100% dp and flow. NYPA has not clearly defined the second stage due to "the dynamic nature of the issue." NYPA states they will closely monitor and participate in industry initiatives in this area and will apply the results of these efforts when they are fully developed.

2.7 Periodic Verification of MOV Capability

- NYPA stated that the potential need for dynamic reverification will be evaluated, and the program changes will be implemented to require dynamic reverification as necessary (Closed).

  NYPA has determined the need for dynamic reverification and has made the necessary program changes to the Plan. NYPA has adopted BWROGs "The Role of IN-SITU Flow Testing in Periodic Verification of Motor-Operated Valve Capacity (Generic Letter 89-10)" for their basis.

2.8 MOV Failures, Corrective Actions, and Testing

- NYPA stated that an updated version of LER 92-002 was to be issued by April 1, 1993 (Closed).

  The LER was updated and issued April 8, 1993. The deficiencies were evaluated and discussed in more detail. The LER was amended using lessons learned by performing GL 89-10 program. The LER was formally reviewed/closed in NRC Report 50-333/93-20.

2.9 Training of MOV Personnel

- NYPA agreed to include specific training requirements for achieving and maintaining skills for engineering personnel involved in diagnostic testing. These elements would be incorporated in training material to be issued by March 31, 1993 (Closed).

  The corrective maintenance program, post-maintenance review of the test packages for completeness, and elements of maintenance, from the INPO accredited training, have been incorporated into the plan for supervisors, engineers and technicians. Training is documented on qualification cards (JDM-93-242) that have been grandfathered to the personnel considered incumbent (hired prior to 1993). This process is ongoing. The inspectors verified that personnel that have been qualified by the program are performing testing. The inspectors also reviewed the periodic reverification program and verified that periodic reverification was being performed.

2.10 Schedule

- NYPA agreed to issue a detailed project schedule of all major uncompleted MOV work items (Closed).

  There is a schedule for testing MOVs; however, there are 13 static and about 93 dynamic tests to be completed and analyzed before the end of the December 1994 outage, along with previously stated elements of the PLAN that are incomplete. This is the third outage since the issuance of GL 89-10 that marks the time that the program must be in place with all testing completed. The inspector had discussions with senior management, of the site, expressing serious reservations as to the on time completion of the GL 89-10 program at the FitzPatrick site. The inspector was given verbal assurance that NYPA was considering action to approach the NRC with an action plan to extend their program.

3.0 PLANT WALKDOWN

The inspectors conducted a plant walkdown to assess the material condition of MOVs. The inspectors observed valves in the secondary containment building and concluded that the MOVs were clean and free of any leaks, such as grease or oil. The stem lubrication for the MOVs appeared to be in good condition and free of hardened grease. The test instrumentation was permanently installed and in good order. The inspector also noted that the facility was clean and free of foreign materials in the inspected area.

4.0 DISCUSSION OF PRESSURE LOCKING AND THERMAL BINDING OF MOTOR-OPERATED GATE VALVES

The FitzPatrick facility experienced pressure locking of a low pressure injection containment isolation valve (10MOV-25B)in the spring of 1991 due to residual hydrostatic pressure that led to motor stall during a post work test. At that point, NYPA performed a root cause analysis to identify any other safety-related valves that might be subject to similar problems. Valves that had a safety-related function were evaluated over a wide range of transients. The study identified 13 valves that would be subjected to pressure binding in the open direction. Five of the valves had a function to close in an accident condition and were not evaluated further. Four valves were modified by connecting a vent path from the valve bonnet to the valve piping to equalize pressure as appropriate. Two valves are normally kept in the open position. The remaining two valves (high pressure injection valves HPCI 23MOV-19 and RCIC 13MOV-21) were dispositioned by calculations as not needing modification.

NYPA has reevaluated the calculations using the Entergy Operations Model (issued February 1993). The Entergy model determined that the HPCI and RCIC valve motor operator would be able to overcome the effects of the differential pressure developed between the bonnet and the process piping due to the sudden loss of process pressure with a 37.5% and 19% margin, respectively. Based on the calculations and the conclusions reached, the design is adequate without modification of the HPCI and RCIC values. The inspector has no further questions at this time.

5.0 VERIFICATION OF PROGRAM IMPLEMENTATION

The inspectors reviewed the calculations determining the design basis differential pressure, design flow conditions, design temperatures, and other design parameters for each of the MOVs listed below.

- 10MOV-89BRHR Heat Exchanger "B" Service Water Isolation Valve
- 13MOV-27RCIC Pump Minimum Flow Isolation Valve
- 13MOV-131RCIC Turbine Steam Inlet Isolation Valve
- 14MOV-5A Core Spray, CSP Pump "A" Minimum Flow Isolation Valve
- 29MOV-77MST Outside Main Steam Drain Isolation Valve

During the review of these valves and others, the inspectors noted that design fluid temperature for some MOVs had not been included in the valve packages. NYPA stated that they had not completed this portion of the design basis reviews and were considering placing a bid for a contractor to complete this portion of the design basis review. NYPA stated once they receive the fluid temperatures and the information reviewed, the fluid temperatures will be incorporated into the design packages.

5.1 MOV Sizing and Switch Setting

NYPA had specified a margin of 15% on the top and bottom of their thrust window calculation for unknowns. The inspectors discussed with the licensee Limitorque's Maintenance Update 92-02. This update changed torque switch repeatability numbers, depending on actuator size and torque switch setting, from 5% to 5, 10, or 20%. NYPA stated that their 15% margin for unknowns would account for the torque switch repeatability numbers of 5% and 10%. NYPA intends to perform repeated static tests to develop their own torque switch repeatability numbers, especially for those valves where the Limitorque data indicates a 20% margin for torque switch repeatability. For MOVs without multiple strokes for comparison, NYPA intends to use a torque switch repeatability established based upon the review of MOVs with multiple strokes. NYPA had reviewed their SMB-000's for torque switch repeatabilities of 5, 10, and 20% to the present torque switch setting. The inspectors did not find any inoperable SMB-000's due to the Limitorque 92-02 maintenance update. However, NYPA had not completed a review of their SMB-000's which might be affected by the limitorque maintenance update.

The inspectors discussed, with NYPA, the number of tests which would be performed to adequately account for torque switch repeatability. NYPA will be expected to have justification and documentation of stroke tests for review during a future inspection to justify their position on torque switch repeatability.

The inspectors discussed, with NYPA, the effects of an increased value for torque switch repeatability either from the Limitorque Maintenance Update 92-02 or from NYPA's own testing and the margin NYPA had set aside for unknown phenomena in their MOVs. With no margin for rate-of-loading in their calculations (draft letter intent only), and increased values for torque switch repeatability, NYPA's did not demonstrate adequate thrust to overcome pressure and flow at design basis. This item will be inspected in a future inspection.

5.2 Design-Basis Capability

The inspectors reviewed NYPA's dynamic test data. This review indicated closing gate valve factors up to 0.574 and load sensitive behavior for gate valves as high as 29.61% (see Appendix A). Based on this data, NYPA's valve factor assumption for gate valves is not always bounding. The inspectors were concerned with NYPA's continued use of a 0.30 valve factor for initial setup of gate valves in the generic letter program, and emphasized that all MOVs not dynamically tested will be expected to have been setup with a methodology that has been validated by the NYPA's dynamic test program by the scheduled program completion date. The inspectors did not identify any operability concerns associated with the valves selected for review.

The inspectors noted that the stem friction coefficient was not always calculated after the completion to the d/p test. Further, the inspectors did not find any provisions for "as found" testing to monitor for degradation of the stem lubrication. Lubrication frequency was noted as every 18 months. NYPA did not have a specific margin set aside in their thrust calculations for stem lubrication degradation. The inspectors discussed with NYPA personnel on how the stem friction coefficient assumption would be verified as required per GL 89-10. NYPA personnel stated they would review their program to justify their position.

6.0 CONCLUSIONS

Many of the team inspection findings were satisfactorily resolved. However, the rate of loading proposal is still in draft form. Bounding fluid temperatures, for dynamic testing, have not been determined. Weak link analysis, although in progress has not been completed. Static testing is still incomplete. Dynamic testing has started, however, out of 113 valves only 32 have been tested and only 5 have been dispositioned as complete. There has not been enough dynamic testing to observe the formal feedback mechanism. As found testing is

not being done to determine long term effects on stem lubrication in order to back feed stem friction coefficient. Torque switch setting repeatability for 5% and 10% has been incorporated into the program. However, there has not been enough dynamic testing to evaluate NYPA's methodology for determining 20% repeatability for some MOVs.

The inspectors noted that additional contractors have been hired to aid in the completion of the program. There is evidence that, generic concerns from other facilities, NRC concerns and the 10 CFR Part 21 issues have been incorporated into the program. Discussion with NYPA management indicated that they would be seeking an extension in order to complete the GL 89-10 program; however, no dates were firm at the exit.

7.0 EXIT

At the conclusion of the inspection on February 11, 1994, the inspector met with NYPA representatives denoted in Attachment 1 and summarized the scope and results of the inspection at that time. NYPA acknowledged the inspection findings as detailed in this report and had no additional comments regarding the inspection results.

APPENDIX A

J. A. FITZPATRICK GATE & GLOBE VALVE DATA

Diagnostics: VOTES/VOTES Torque Cartridge System

VALVE NUMBER	VALVE SIZE & MANUFACTURER	TEST CONDITIONS psid	DYNAMIC VALVE FACTOR[1]	STEM FRICTION COEFFICIENT [2]	LOAD SENSITIVE BEHAVIOR[3]
10MOV-89B	16" Anchor Darling 150# Gate	168.3 (Close) 168.3 (Open)	0.574 (Close) 0.375 (Open)	0.081	29.61%
13MOV-27	2" Velan 900# Globe	1205 (Close) 1205 (Open)	0.861 (Close) 0.638 (Open)	Not Determined	10.26%
13MOV-131	3" Velan 900# Gate	995.1 (Close) 995.1 (Open)	0.568 (Close) 0.483 (Open)	Not Determined	-16.24%
14MOV-5A	3" 300# Split Wedge Gate	355.5 (Close) 355.5 (Open)	0.325 (Close) 0.412 (Open)	Not Determined	3.53%
29MOV-77	3" Anchor Darling Double Disc Gate	954.8 (Close) 954.8 (Open)	0.427 (Close) 0.136 (Open)	Not Determined	4.92%

1. The dynamic valve factors listed were calculated by the licensee using a mean seat diameter.
2. Grease used at the time of testing was Mobilux EP-0.
3. A negative number indicates that the thrust observed at CST during the dynamic test was greater than the thrust observed at CST during the static test.

ATTACHMENT 1

Exit Attendees

New York Power Authority

J. D. Cameron	MOV Group Lead Engineer
M. J. Colomb	General Manager - Support Service
J. R. Hedely	Sr. Licensing Engineer
J. Kaucker	Director - Nuclear Operations & Maintenance
D. Lindsey	General Manager - Maintenance
G. Lozier	Assistant Maintenance Manager
M. V. Redding	Public Affairs
H. Salmon	Resident Manager
D. Simpson	Sr. Licensing Engineer
P. Swinburne	Maintenance Engineer
D. VanDermarr	QA Supervisor
M. Weeks	Maintenance Engineer

U.S. Nuclear Regulatory Commission

W. Cook	Sr. Resident Inspector

ATTACHMENT 2

Documents Reviewed

NYP-830-002	MOV Population Selection
NYP-830-003	MOV Prioritization
NYP-830-004	Operating Conditions Evaluation
NYP-830-005	MOV Database Development
NYP-830-006	Electrical Review
NYP-830-007	Thrust and Torque Evaluation
NYP-830-008	MOV Capability Evaluation
NYP-830-009	Differential Pressure Test Procedures
EDP-33	Procedure for Sizing of Motor-Operated Valve Actuators
MP-59.36	Baseline Testing of Limitorque Valves Using VOTES
MDSO-23	MOV Engineering Database
MP-59.37	Analysis of MOV Diagnostic Testing Using Liberty Technologies VOTES System

Safety Evaluations and Calculations for DC Operated Valve Stroke Times

JAF-SE-93-093	13MOV-27
JAF-CALC-CAD-01361	27MOV-122 & 123
JAF-SE-93-104	27MOV-122 & 123
JAF-CALC-HPCI-01372	23MOV-60
JAF-CALC-IST-01319	29MOV-77
JAF-CALC-RHR-10364	10MOV-17
JAF-RPT-MULTI-00746	"Generic Letter 89-10 Motor-Operated Valve Program Plan", Revision 6
MOV Group RC GL 89-10	Program Schedule, February 4, 1994
EDP-33	Procedure for Sizing MOVs
JAF-CALC-RHR-00796	Over Thrust Calculations for 10 MOV 39A
LER 92-002-01-MOV	Updated Report