U. S. NUCLEAR REGULATORY COMMISSION
REGION I

NINE MILE POINT UNITS 1 & 2
MOTOR-OPERATED VALVE INSPECTION

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Inspection Summary: See Executive Summary

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EXECUTIVE SUMMARY

The Nuclear Regulatory Commission (NRC) conducted a team inspection at the Nine Mile Point Nuclear Power Stations on June 22 - 26, 1992 to assess the programs developed by the licensee in response to NRC Generic Letter 89-10 (GL 89-10), "Safety-Related Motor-Operated Valve Testing and Surveillance." This team inspection was accomplished in accordance with NRC Temporary Instruction (TI) 2515/109, "Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance." The generic letter and its Supplements (1, 2, 3 and 4) provided recommendations to the licensees for the development of adequate programs to ensure operability of safety-related motor-operated valves (MOVs) during design-basis conditions. The team had a number of findings regarding the developments of the MOV program. The most significant findings are as follows:

- The Generic Letter 89-10 program responsibilities are clearly delineated in the program description. The individuals with GL 89-10 program responsibilities were knowledgeable and were cognizant of current industry efforts in this area.

- The final scope of the valves to be included in the program was not completed at the time of this inspection.

- In general the procedures and methodology for performing design-basis reviews for Unit 2 met the intent of the generic letter. Justifications for assumptions made for the undervoltage calculations needs further documentation. Unit 1 had not begun design-basis reviews at the time of this inspection.

- Motor-operated valve switch setting calculation methodology currently uses assumptions such as removal of the application factor, use of stall efficiency for globe valves and the use of 110% of name plate rated motor torque for actuator capability. Documentation justifying these assumptions needs to be added to the GL 89-10 program.

- The control of torque switch settings at Unit 1 was inadequate. The preventative maintenance procedures, which record the torque switch settings, were not properly implemented.

- The response to Supplement 3 to the Generic Letter generally was appropriate; however, additional reviews are necessary regarding the applicability of industry test results for 10-inch Velan gate valves and the voltage used for the actuator capability calculation for valve MOV 2ICS*MOV-128.

- In situ differential pressure testing has not been conducted at either unit. Discussions with licensee staff indicated that the plans for differential testing of valves appears to meet the intent of the generic letter.

- A MOV trending program which meets the intent of the generic letter had not been developed.

- Three refueling outages remain to complete the GL 89-10 program at Unit 1. The completion date for the Unit 2 MOV program is June 1994. Only one refueling outage remains at Unit 2 prior to the recommended program completion date.

The team concluded that a significant effort is currently underway to address the generic letter. In areas such as design-basis reviews at Unit 2, a significant amount of work had been completed and the quality of the work was good. However, a significant effort remains to complete this program in accordance with the schedule outlined in the generic letter. A focused effort will be required to complete this program at Unit 2 by June 1994.

1.0 INTRODUCTION

On June 28, 1989, the NRC staff issued Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," which provided recommendations to the licensees for the development of adequate programs to ensure operability of safety-related motor-operated valves (MOVs) during design-basis conditions. The generic letter recommended that each licensee complete all design-basis reviews, analyses, verifications, tests and inspections that have been instituted within 5 years or three refueling outages, whichever is later, of the date of the generic letter (June 28, 1989). The staff held public workshops to discuss the generic letter and to answer questions regarding its implementation. On June 13, 1990, the staff issued Supplement 1 to Generic Letter 89-10 to provide the results of the public workshops. In Supplement 2 (issued on August 3, 1990) to Generic Letter 89-10, the staff stated that inspections of programs developed in response to the generic letter would not begin until January 1, 1991. In response to concerns raised by the results of NRC-sponsored motor-operated valve tests, the staff issued Supplement 3 to Generic Letter 89-10 on October 25, 1990, which requested that boiling water reactor licensees evaluate the capability of motor-operated valves used for containment isolation in the steam lines to the high pressure coolant injection system and reactor core isolation cooling system, in the supply line to the reactor water cleanup system, and in the lines to the isolation condenser. On February 12, 1992 the staff issued Supplement 4 to Generic Letter 89-10 to clarify that considerations for inadvertent operation of MOVs may be excluded from the program scope for boiling water reactors (BWRs).

The NRC inspection team used Temporary Instruction (TI) 2515/109 (dated January 14, 1991), "Inspection Requirements for Generic Letter 89-10, Safety-Related Motor-Operated Valve Testing and Surveillance," to perform this inspection. The inspection focused on Part 1 of the TI, which involves a review of the program being established by the licensee in response to Generic Letter 89-10.

2.0 GENERIC LETTER 89-10 PROGRAM

Niagara Mohawk Power Corporation provided their response to Generic Letter 89-10 for the Nine Mile Point Nuclear Power Stations, Units 1 & 2 in a letter to the Nuclear Regulatory Commission (NRC), dated December 28, 1989. This letter requested a delay in the GL 89-10 response for six months pending the review of the BWR Owners Group generic program. Based on additional information regarding the scope of the BWR Owners Group generic program development, the request to defer the response was denied in a letter from the NRC dated September 6, 1990. Niagara Mohawk provided a second response to GL 89-10 on October 10, 1990. This letter stated that a draft program description would be developed by January 1, 1991. A third response to GL 89-10 was submitted by the licensee in a letter dated February 5, 1992. This letter stated that Niagara Mohawk intended to meet the schedule and recommendations of GL 89-10 as described in the Nine Mile Point Units 1 & 2 Program Plans. The licensee provided a response, to Generic Letter 89-10, Supplement 3,

on March 7, 1991 and March 12, 1991 for Units 1 & 2 respectively. The NRC staff replied to the Supplement 3 response on June 24, 1991 and requested that the licensee provide additional information. The additional information was provided to the NRC in a letter dated July 29, 1991 and the NRC acknowledged the receipt of this information in a letter dated March 12, 1992. The team reviewed the licensee's response to the generic letter and the program details with licensee personnel. The inspection results related to each aspect of Generic Letter 89-10 are described below.

2.1 Program Scope and Administration

The program administration was reviewed to assure that the licensee has an adequate program plan and has delineated responsibilities to complete the Generic Letter 89-10 program commitments. The program scope is reviewed to assure that all appropriate valves have been included in the program.

The Motor-Operated Valve Program Plan Descriptions for Nine Mile Point Units 1 & 2 provides clear delineation of the MOV program organization and responsibilities. The Generic Letter 89-10 organization includes a program manager, a project manager for each unit, and appropriate technical support staff. Each site has a dedicated MOV site support coordinator. The MOV organization staff interviewed were cognizant of their assigned responsibilities and were knowledgeable of the recommendations of the generic letter. The staff stated that they routinely participate in industry groups such as the Boiling Water Reactor MOV User Group.

The valves currently included in the Generic Letter 89-10 program scope are listed in Attachment 2 of the "MOV Program Plan Description." The attachment lists all motor-operated valves which are in the safety-related systems. Generic Letter 89-10, Supplement 4, allows valves which were included in the program, solely for inadvertent operation, to be removed from the program for boiling water reactors (BWRs). The licensee stated that they intend to remove inadvertent operation valves from the GL 89-10 program and had set July 1992 as a milestone to complete this activity. The valves currently included in Attachment 2 of the "MOV Program Plan Description" meet the intent of the generic letter; however, the final program scope of valves was not completed. The licensee staff estimated that approximately 65 valves at Unit 1 and 186 valves at Unit 2 will remain in the final program scope.

2.2 Design-Basis Reviews

Item "a" of the Generic Letter 89-10 and Generic Letter 89-10, Supplement 1, recommended that the licensees review and document the design-basis for the operation of each motor-operated valve within the program for such parameters as:

1. Differential Pressure
2. Flow
3. Valve Orientation
4. External Factors
5. Ambient Temperature
6. Fluid Temperature
7. Minimum Voltage

2.2.1 **Nine Mile Point - Unit No. 1**

Procedures describing the methodology to be used for developing design-basis reviews have not been developed for Unit 1. Therefore, the design basis reviews were not reviewed for Unit 1 during this inspection. The goal for completion of the design basis reviews at Unit 1 is July 1993.

The undervoltage calculations for Unit 1 were reviewed. These undervoltage calculations were previously reviewed during an Electrical Distribution System Functional Inspection (EDSFI) conducted Sept. 23 - Oct. 25, 1991 (NRC Inspection Report 50-220/91-80). The EDSFI concluded that the voltage provided to MOVs was acceptable.

The team reviewed the overload relay setpoints and methodology used to determine the setpoints. The team observed that the licensee has removed the overload protection in the dc circuits consistent with the need and safety importance of valve operation. The team determined that the methodology used to set the ac relay setpoints was consistent with the need of the valve function and required testing.

2.2.2 **Nine Mile Point - Unit No. 2**

The methodology for conducting design-basis reviews is documented in the Generic Letter 89-10 Program Description 2PPD-GL-89-10, "Motor Operated Valve Program Description for Nine Mile Nuclear Station Unit #2," DBR-GEN-001, "Nine Mile Point 2, Motor Operated Valve Design Basis Review, General Assumptions and Input Data," and NEG-2M-001, "Nuclear Engineering Guideline, Design Basis Review for Safety Related Motor Operated Valves." The methodology used to conduct design-basis reviews was reviewed to assure that the intent of the generic letter was satisfied. The licensee had completed 8 design-basis reviews at the time of this inspection. An additional 142 packages were complete and ready for review. The current goal is to complete the design-basis reviews by the end of 1992.

Nuclear Engineering Guideline, NEG-2M-001, directed a review of the Final Safety Analysis Report (FSAR), system operating procedures, system logic diagrams, General Electric system design specifications, and emergency operating procedures to determine worst case design-basis conditions for the valves. Design-basis reviews use the methodologies described in the BWR Owners Group (BWROG) guidelines where applicable. The instructions provided for determining the worst case design-basis conditions were detailed and satisfied the intent of the generic letter.

Guidance for determining line pressure, differential pressure, flow rate, temperature, and fluid phase were provided in DBR-GEN-001 and NEG-2M-001. Detailed guidance was provided for certain assumptions such as neglecting the pressure drop due to line losses and using water levels that produced worst-case differential pressure conditions. The guidance for determining the differential pressure across valves during blowdown conditions included a fluid deceleration term. The inclusion of the fluid deceleration term is consistent with the Boiling Water Reactors Owners' Group guidelines.

Based on the packages reviewed, assumptions regarding reactor pressure were generally conservative. However, differential pressure determinations for reactor water cleanup system (RWCU) valves 2WCS*MOV102 and 2WCS*MOV112 were based on nominal reactor pressure. This assumption is consistent with the BWROG's position on use of nominal reactor pressure for the RWCU system isolation valves. The BWROG's position is currently under review by the NRC. Pending resolution by the staff, licensee personnel stated that they will verify that the BWROG's scenario is applicable at Nine Mile Point.

The undervoltage calculation for MOVs was reviewed. The effects of transient voltage drops were not included in the calculation. The licensee stated that it is unnecessary to account for the transient voltage drop since the steady state voltage, just above the degraded grid relay setpoint, is being used. The licensee stated that undervoltage assumptions were being addressed by the BWR Owners Group and the owners group position would be incorporated into the MOV program. The licensee stated that assumptions made regarding undervoltage transients would be justified as part of the GL 89-10 program.

The licensee used a recent dc surveillance test to obtain a battery voltage for their dc undervoltage calculation. The surveillance test measured the voltage of a relatively new battery. The dc voltage value obtained by this test was higher than the projected end of life battery voltage as specified in the FSAR. The licensee stated they would justify assumptions made regarding dc undervoltage calculations as part of the GL 89-10 program.

As dc voltage to MOVs decreases the stroke time of dc valves increases. The licensee had not evaluated the impact of degraded dc voltage on MOV stroke times to assure that stroke time requirements are satisfied. Licensee personnel stated that this evaluation would be performed.

Nuclear Engineering Guideline NEG-2M-001, Section 5.2.4, excluded consideration of degraded voltage for manually operated active safety valves that required operation during or after an accident. Adequate justification for this position was not documented in the program. The licensee stated that this exclusion was not being used and would be removed from the program.

As motor temperature increases the torque output of the motor decreases. The effects of high temperature on the output of ac motors had not been evaluated. Licensee personnel indicated that any information provided by Limitorque regarding the effects of high ambient temperature on ac motors would be evaluated for inclusion in their generic letter program, as appropriate. High ambient temperature effects on dc MOVs will be accounted for as discussed in Limitorque's SEL-5.

2.3 Diagnostics Systems

2.3.1 Nine Mile Point - Unit No. 1

GL 89-10 diagnostic testing of motor-operated valves has not been performed at Unit 1. Limited diagnostic testing for maintenance purposes has been conducted. The licensee has the model 2150 Motor Operated Valve Analysis and Test System (MOVATS) equipment. The licensee stated that they have not made a decision about which MOV diagnostic equipment to buy for the GL 89-10 testing, but plan to make the decision by January 1993.

2.3.2 Nine Mile Point - Unit No. 2

Unit 2 has tested thirty MOVs using the Valve Operator Testing and Evaluation System (VOTES) diagnostic equipment. A VOTES inaccuracy of either 9.2 or 12 percent (depending on the calibration method) is used for determining the equipment inaccuracy. Site specific VOTES testing procedures are used to control the setup and testing of the valves. The VOTES procedures are detailed and generally conform with the standard VOTES procedures.

The licensee stated that the motor-operated valve diagnostic systems vendor equipment validation results, as reported by the Motor-Operated Valve User's Group (MUG), or results of a comparable test program, would be reviewed and inaccuracies from such reports would be incorporated into the Niagara Mohawk Power Motor-Operated Valve Program acceptance criteria, as appropriate.

2.4 MOV Switch Settings and Setpoint Control

Item "b" of Generic Letter 89-10 recommended that licensees review and revise as necessary, the methods used for selecting and setting all motor-operated valve switch settings.

2.4.1 Nine Mile Point - Unit 1

Unit 1 does not currently have any completed thrust calculations in support of Generic Letter 89-10. The goal for completion of the MOV switch setting calculations is late 1993.

The control of torque switch dial settings was reviewed. The team concluded that the control of torque switch dial settings was inadequate. The MOV torque switches are primarily controlled based on torque switch dial settings. A small number of torque switches were set using MOVATS diagnostic test equipment and calculated thrust windows. The required torque switch dial settings and thrust windows are listed on controlled plant drawings. The actual torque switch dial settings are recorded for each MOV during the performance of the MOV preventive maintenance (PM) procedure (N1-EMP-GEN-R120 (ac valves) and N1-EMP-GEN-R121 (dc valves), step 7.5.3). The team compared the actual torque switch dial settings recorded in recently completed PM procedures to the required dial settings listed on the plant drawings to verify that the torque switches were properly set. A number of torque switch dial settings were identified which were not consistent with the required dial settings provided on the plant drawings. Lower than required torque switch settings could result in valves that can not operate per the design requirements. Higher than required torque switch

settings could over torque or over thrust the valve. Since the unit was shut down and defueled, an immediate operability determination for these valves was not required. The preventative maintenance procedure did not explicitly state that the recommended torque switch settings were located on the plant drawings. Some of the technicians interviewed erroneously stated that these values were from stickers located on the torque switches. The procedure acceptance criteria was also weak in that in did not state that torque switch readings outside of the recommended values constituted a test failure. The failure to provide an adequate procedure, such that a qualified individual could record and evaluate torque switch dial settings, is a violation of NRC requirements. (NRC Violation 50-220/92-82-01)

The licensee conducted an evaluation of this finding and identified 9 valves which require evaluation. The licensee has issued Deviation Event Reports (DERs) for the 9 MOVs to evaluate these discrepancies. This item remains unresolved pending the resolution of the DERs (NRC Unresolved Item 50-220/92-82-02).

2.4.2 **Nine Mile Point - Unit 2**

Nuclear Engineering Guideline, NEG-2M-002, "Limitorque Motor Operated Valve Torque Switch Setting Confirmation," provides the methodology for performing motor-operated valve sizing and switch setting calculations. At the time of this inspection, only the Supplement 3 valve sizing and switch setting calculations were complete. The current schedule indicates that the goal for completing the sizing and switch setting calculations is the end of 1992.

The standard industry thrust equation was used for determining the required minimum thrust for gate and globe valves. The worst case differential pressures, used to determine the minimum thrust, is derived from design-basis calculations. The licensee's program documents stated that valve factors of 0.30 for gate valves, 0.20 for parallel disk gate valves, and 1.10 for globe valves would be used. Thrust requirements based on a 0.30 valve factor for flexwedge gate valves have been shown to yield non-conservative results in some analytical thrust determinations. The licensee stated that valve factor assumptions would be verified using the results from differential pressure testing and industry test results.

The MOV program does not provide a feedback process where an evaluation of differential pressure test results would be used to determine available thrust margins. Differential pressure test results should be used to validate assumptions used in thrust equations to ensure that design-basis thrust requirements used for MOV baseline setup remain valid. Licensee personnel stated that a method to evaluate dynamic test results and to validate assumptions would be added to the generic letter program.

The switch setting methodology uses an assumed value of 0.15 for the stem friction coefficient. An assumption of 0.15, as the stem friction coefficient, may be non-conservative unless specific maintenance practices and lubrication frequencies are implemented. The licensee had not justified the use of a 0.15 stem friction coefficient. The licensee stated that additional diagnostic test equipment would be procured and diagnostic test results would be used to justify the stem friction coefficient assumption.

The MOV program does not provide guidance for addressing the effects of load sensitive motor-operated valve behavior known as "rate-of-loading." Load sensitive motor-operated valve behavior can reduce the thrust delivered by the operator under high differential pressure and flow conditions. The cognizant engineer stated that guidance for the "rate-of-loading" effect would be incorporated into the generic letter program as part of the dynamic test program.

The licensee's methodology for specifying the upper range of allowable torque switch settings included consideration of the actuator output with degraded voltage conditions. However, the standard capability equations were revised in the following manner:

- Application factor was not included.
- Stall efficiency was used in lieu of pull-out efficiency for globe valves.
- Credit was taken for 110% of name plate rated motor torque.

The generic letter program did not include adequate justification for these modifications to standard capability sizing equations. The licensee stated that justification for these assumptions would be included in the GL 89-10 program.

The licensee did not have complete valve-related weak link information. Requests had been made to valve vendors to provide this information and will be included in the generic letter program when available. The valve weak link information was not reviewed during this inspection.

Nuclear Engineering Guideline NEG-2M-002, provides guidance for the adjustment of the target thrust window for diagnostic equipment inaccuracies. However, the guideline does not specify the specific inaccuracy value to be used or account for torque switch repeatability. The licensee stated that $\pm 9.2\%$ or $\pm 12\%$ margin (depending on calibration method) was used to account for VOTES equipment inaccuracies. However, the licensee's guidance did not include an allowance for torque switch repeatability. The cognizant engineer indicated that Limitorque guidance regarding torque switch repeatability will be included in the program.

Generic Letter 89-10 motor-operated valves with an open safety function have their torque switches bypassed for approximately 95% of the open stroke to prevent high unseating loads from prematurely stopping valve operation. GL 89-10 MOVs have the torque switch bypassed for 95% of the closing stroke. At this point the torque switch is reinstated into the control circuit to allow thrust seating of the valve. Valves with no open safety function have their torque switch bypassed for the first 5% to 20% of the stroke. This setting will be adjusted as necessary based on test results.

The control of torque switch setting control was reviewed. The torque switches are set based on dial settings. The minimum and maximum torque switch dial settings are listed on controlled plant drawings. The actual dial settings are routinely recorded in the MOV preventive maintenance procedures. The dial settings recorded in the most recent preventive maintenance procedure were compared to the required settings listed on the plant drawings for approximately 25% of the active safety-related valves. The team verified that the torque switches were properly set and concluded that Unit 2 had incorporated appropriate controls for controlling torque switch settings.

2.5 Supplement 3 Response

2.5.1 Nine Mile Point - Unit 1

A total of 7 motor-operated valves in the emergency condenser and reactor water cleanup (RWCU) systems were included in the scope of Supplement 3 to Generic Letter 89-10. The licensee concluded that each Supplement 3 motor-operated valve had the ability to function under design-basis conditions. The licensee used the best available data to make this determination. Generic Letter 89-10 design basis-reviews and thrust calculations have not been completed for these MOVs. The Supplement 3 response was reviewed and determined to be appropriate.

Unit 1 personnel indicated that a recent Anchor Darling report CTS-27, "Anchor Darling Valve Company Report on Blowdown Testing ADV 900# Double Disk Gate Valve" had not been received. Unit 1 personnel stated that this report would be reviewed for applicability to the Unit 1 Supplement 3 parallel disk gate valves.

2.5.2 Nine Mile Point - Unit 2

A total of 8 motor-operated valves in the high pressure core spray (HPCS), reactor core isolation cooling (RCIC), reactor water cleanup (RWCU), and feedwater systems were included in the scope of Supplement 3 to Generic Letter 89-10. The licensee concluded that each Supplement 3 motor-operated valve had the ability to function under design-basis conditions.

The worst-case differential pressure requirement for the feedwater isolation valves, 2FWS*MOV21A/B was reduced from 1380 psid to 100 psid. A review of accident scenarios, system operating procedures, and emergency operating procedures indicated that these valves were not required to close against feed pump discharge pressure. The original differential pressure of 1300 psid could only occur through a mispositioning event from the control room which was excluded based on the guidance in Supplement 4 to GL 89-10. The assumptions made for feedwater isolation has been submitted to the NRC in letter NMP2L 1346, dated June 15, 1992. This submittal is currently being reviewed by the staff.

The degraded voltage assumption used for valve 2ICS*MOV128 was inconsistent with the Final Safety Analysis Report statement that electrical equipment be operable with 80% of nominal voltage. The voltage assumed in the actuator capability calculations was greater than 80% for this valve. The licensee had issued a Deviation Event Report (DER) to address this discrepancy. It appears that a voltage greater than 80% will be provided to this valve; therefore, a clarification of the FSAR statement may be required.

A 0.3 valve factor was used for their Supplement 3 MOVs capability calculations. The submittal did not discuss the applicability of the NRC-sponsored MOV testing for the Supplement 3 MOVs. Licensee personnel stated that a review would be conducted to determine if the 10" Velan test results are applicable to Supplement 3 MOVs.

As discussed in Section 2.4.2 of this report, the standard Limitorque equations were revised to determine the allowable upper range for setting of torque switches. The available window for torque switch setup may be reduced significantly if the method requires modification. Valve 2ICS*MOV170 appears to be marginal based on calculations using the standard industry equation. Licensee personnel stated that operability of these valves would be reviewed once the issues regarding the sizing equations are resolved.

2.6 Motor-Operated Valve Testing

Action "c" of the generic letter recommended that licensees test motor-operated valves in situ under their design-basis differential pressure and flow conditions. If testing in situ under those conditions is not practicable, the NRC allows alternate methods to be used to demonstrate the capability of the motor-operated valve. The NRC suggested a two-stage approach for a situation where neither design-basis testing in situ is practicable nor an alternate method of demonstrating motor-operated valve capability can be justified. With the two-stage approach the capability for the motor-operated valve is evaluated using the best data available and then efforts are continued to obtain valve specific test data within the schedule of the generic letter.

Design-basis differential pressure testing has not been conducted. In the October 10, 1992 response to the generic letter Niagara Mohawk Power Corporation stated in part that "where practical and useful in enhancing the reliability of an MOV, Niagara Mohawk intends to follow the specific guidance provided in GL 89-10." However, the program description allows validation without in situ testing for MOVs with a sufficient conservative design, where there is adequate margin for potential degradation and design uncertainties. Candidate MOVs for in situ testing not dynamically tested will be evaluated for the following alternatives:

1. Performance of the test under less severe conditions;(two-stage testing)

2. Use of test data from a prototype MOV in the plant, a different plant, or a test facility;

3. Use of industry research (e.g., EPRI MOV performance prediction program).

The testing criteria for in situ testing has not been established and candidate valves have not been identified; however, discussions with cognizant staff indicated that the plans for differential pressure testing appear to meet the intent of the generic letter.

2.7 Periodic Verification of MOV Capability

Action "d" of the generic letter recommended that licensees prepare or revise procedures to ensure that adequate motor-operated valve switch settings are established and maintained throughout the life of the plant. Paragraph "j" of the generic letter recommended that the surveillance interval be commensurate with the safety function of the motor-operated valve as well as its maintenance and performance history. In no case should the interval exceed 5 years or 3 refueling outages. Further, the capability of the motor-operated valve should be verified if the motor-operated valve is replaced, modified, or overhauled to an extent that the test results are not representative of the motor-operated valve performance.

The licensee currently plans to periodically test motor-operated valves by stroking the valves under static conditions. The relationship between the performance of a motor-operated valve under static conditions and design-basis conditions is not clearly established. Therefore, at this time, it is not entirely evident that a static test would verify valve performance under design-basis dynamic conditions. The licensee acknowledged this concern and stated that the position to periodically test motor-operated valves under static conditions would be revisited following the dynamic testing and evaluation of the Boiler Water Reactors Owners Group positions of periodic verification.

2.8 MOV Maintenance and Post Maintenance Testing

The corrective and preventive maintenance procedures for MOVs were reviewed. Procedures N1-EMP-GEN-R110, N1-EMP-GEN-R120, Unit 1, and N2-EMP-GEN-V520, N2-EMP-GEN-510, Unit 2, are used to conduct corrective and preventive maintenance for motor-operated valves. These procedures were reviewed and found to be thorough and technically sound.

The licensee stated that they did not plan to overhaul the motor-operators for Units 1 & 2 prior to doing the baseline static tests, and did not have any plan for periodic overhauls. The licensee stated that they would justify their position on valve overhauls as part of their GL 89-10 program.

The licensee checks the gearbox lubrication level and stem lubrication on safety-related, environmentally qualified (EQ) motor-operators every 18 months and safety-related, non-EQ valves every 24 months at Unit 2. The team considers this an adequate interval based on the vendor's recommendations. For Unit 1, the licensee checks the gearbox lubrication level and stem lubrication on safety-related, environmentally qualified motor-operators every 24 months and safety-related, non-EQ valves every 48 months. The licensee stated that justification of the stem lubrication interval which deviates from the vendor's recommendation would be justified as part of the GL 89-10 program.

The licensee stated that they are using a nickel based anti-seize material for stem lubrication. They are aware that the anti seize material has been replaced by EP-1 or EP-0 as the recommended lubricant. The licensee stated that they will evaluate stem lubricants as part of the MOV program.

The licensee's ASME Section XI Inservice Testing (IST) program for MOVs met the requirements of the ASME code for Unit 2. Unit 1 was built before the IST requirements, but the licensee has fitted the program to Unit 1. The data reviewed was well organized and effectively trended.

Post Maintenance Testing utilizes stroke time testing as the means to verify that the valve's operation has not been affected by the maintenance activity. The licensee stated that they plan to evaluate the need for additional testing such as using diagnostic test equipment as part of their GL-89-10 program.

The team noted that the modification package (EDC NO. 2M10415) and work package (W195382) to change the spring pack on valve 2ICS*MOV128 did not include a 10 CFR 50.59 review of the modification to the spring pack, but only a review of the change to the torque switch setting. The existing 10 CFR 50.59 review was revised to include the spring pack modification. The spring pack modification was made because the original torque value required a spring pack which is now obsolete.

2.9 MOV Failures, Corrective Actions, and Trending

Action "h" of the generic letter recommended that licensees analyze each motor-operated valve failure and justify corrective action. The results and history of each as-found deteriorated condition, malfunction, test, inspection, analysis, repair, or alteration were recommended to be documented and maintained. This motor-operated valve information was recommended to be periodically examined (every 2 years or after each refueling outage after program implementation) as part of the monitoring and feedback effort to establish trends of motor-operated valve operability.

Niagara Mohawk Power Corporation, Nine Mile Point Nuclear Station Administrative Procedure AP-5.4.2, "Troubleshooting" is used in conjunction with the "Limitorque Disassembly and Assembly of Type SMB, SB, and HBC Series Operators" procedure to troubleshoot motor-operator deficiencies. The procedures are used to implement the evaluation and documentation of corrective actions associated with motor-operated valve operators. The technician's "cause" is reviewed with the department supervisor. In general, the root causes that were reviewed, along with the corrective actions taken, were determined to be thorough.

Due to inaccuracies in the old MOVATS system several valves were inadvertently left in an over thrust/over torque condition at Unit 2. The licensee has reviewed these valves and has inspected and retested them using the VOTES equipment. In those cases where the valves were verified using VOTES as over-thrusted and/or over torqued, the Limitorque guidance was used to inspect the MOV operator. The actions taken with regard to overthrusted valves at Unit 2 was appropriate.

The team reviewed maintenance practices to assure that inappropriate mixing of grease in MOVs would not occur. The licensee stated that they cleaned and replaced grease in Unit 1 environmentally qualified valves, but did not replace the grease in other safety-related valves. The Unit 1 reactor vent valve, 37-02, was identified as having black grease that had separated. A Unit 2 valve, 2MSS*MOV108 was also identified as having very dark grease, almost black, and on the verge of hardening. The licensee stated that they currently use EP-0 or EP-1 greases and stated that these greases are incompatible with the SUN EP-50 grease that was originally present in the Unit 1 valves. The licensee stated that they will examine the remaining safety-related valves in Unit 1 to determine if there is mixed grease present and would review the potential for mixed grease in Unit 2 MOVs.

The licensee is currently trending MOV failures and diagnostic test equipment results. The licensee staff stated that a formal trending program consistent with the recommendations of GL 89-10 and the BWR Owners Group would be developed. The GL 89-10 trending was not reviewed during this inspection.

2.10 Motor-Operated Valve Training

The licensee's motor-operated valve training courses, facilities, and knowledge of training personnel relating to the implementation of the GL 89-10 program were evaluated. The licensee requires that all personnel including contractors involved in the motor-operated valve program complete training prior to performing maintenance or testing on motor-operated valves. Training includes classroom as well as hands on performance and is Institute of Nuclear Power Operations (INPO) accredited.

Engineers, electricians, and contractors are provided training in the use of diagnostic testing. The electricians are qualified to perform data acquisition, while the engineers and contractors are qualified to perform data acquisition and analysis. This training is conducted by B&W Technologies and audited by the Niagara Mohawk training department. At the present time VOTES testing is performed at Unit 2. Babcock and Wilcox (B&W) Technologies provided a four day VOTES training course. Verification of contractor qualifications is made prior to course instruction. The training will be provided for the diagnostic test equipment to be used at Unit 1, once the equipment selection has been made.

Qualification of personnel to perform maintenance or testing in the duty area of motor-operated valves is based on successful completion of an initial Limitorque actuators course, associated labs, and selected job performance measures (JPM). JPMs are used to measure a trainee's ability to successfully complete a task. The tasks are designed to ensure personnel have the knowledge, skills, and experience needed to perform assigned job duties. Training and JPMs were thorough and provided good instruction in many motor-operated valve areas.

Areas include valve actuators, limit and torque switch adjustments, and troubleshooting. Instruction was also provided for industry events. Following the initial training course a test is given and a hands on practical is conducted to verify the individuals ability to perform MOV maintenance. Continuing training is provided on MOVs as a refresher course. This is determined by plant supervision and is scheduled as necessary.

Training for motor-operated valves and VOTES diagnostic test equipment is provided in the Nine Mile Point Training Center. The facility was well equipped with training aids and mockups. The lessons plans and hands-on labs were thorough and well organized. The licensee indicated that a refresher training schedule was being developed to ensure personnel maintain their qualifications.

2.11 Industry Experience and Vendor Information

Guidance is provided in NUREG 0737 for developing procedures to assure that important information on operating experience is provided to operators and is incorporated into plant operating procedures and training programs. The vendor information program with regard to motor-operated valves was reviewed.

The Nuclear Division Interface Procedure NIP-ECA-01, "Deviation Event Report" implements the process for evaluating industry experience and vendor information. Nuclear Engineering is responsible to initiate deviation event reports for vender initiated 10CFR21 notifications applicable to Nine Mile Point. However, Quality Assurance initiates deviation event reports for Limitorque Maintenance Updates.

The Limitorque Maintenance Updates and 10CFR21 Notifications reviewed were received and actions were taken to implement recommendations. However, in one isolated case, the actions taken to implement the recommendations of Limitorque Maintenance Update 88-2, regarding spring pack hydraulic lock had not been evaluated. The standby liquid control system valve (38-13) remained a candidate for hydraulic lock modification. The licensee stated that the Limitorque Maintenance Update 88-2 would be reviewed.

2.12 Schedule

The Unit 1 program schedule extends to late 1996 or early 1997 depending on the refueling outage schedule at that time. The Generic Letter 89-10 had requested that the program be completed in 5 years or three refueling outage which ever is later. The GL stated that in considering the three outages for the purpose of the GL, any outage within six months of the issuance of the GL would not be counted. The Unit 1 at the time of the issuance of the GL was in an extended outage of approximately 30 months (from 1/22/88 to 7/2/90); thus, the third outage for the Unit 1 would not come until late 1996 or early 1997.

Unit 2 went into commercial operation in 1988. The first refueling outage of the unit was six months after the date of the generic letter, and the second refueling outage was in the spring of 1992, and the third outage is scheduled for September 1993. Therefore, the licensee has five years from the issuance of the GL 89-10 (June 1994). The licensee had scheduled 50% of the work to be completed in the refueling outage of 1992 and the balance 50% in the 1993 outage. However, the scheduled work for 1992 was not completed, due to unanticipated problems in the implementation.

The schedule for Unit 2, as it stands now is:

- Design-basis analysis/reviews will be finished by December 1992 or January 1992.
- There are 177 safety-related "active" valves, of which 144 have been reviewed/analyzed, but the analysis has not been approved.
- Thirty valves out of the above 177 were listed in 1992-outage, although their analysis were not reviewed or approved. The licensee informed the inspector that these valves were tested before approved analysis because of a high confidence of engineers in the validity of the analysis.
- Methods of static test have been selected and approved; testing equipment is onsite, additional equipment will be purchased if needed.
- Dynamic test methods and procedures have not been developed, and are scheduled to be finalized by December 1992.

In light of the above status of the Unit 2 MOV program, a focused management attention will be required to complete the program within the schedule recommended in the generic letter.

3.0 WALKDOWN

During a walkdown of plant MOVs, the switch cover for Unit 1, motor-operated valve MOV 05-05 was opened for inspection. The inspectors observed the technicians performing sections of the preventative maintenance procedure for this valve. The technicians had recorded a torque switch settings in the procedure which was not in conformance with plant drawings. The technicians indicated that the valve was not declutched prior to recording the torque switch setting. The MOV site engineer was aware that this type of valve required declutching prior to reading the torque switch setting and took action to declutch the valve and record the actual torque switch reading. The technicians who were conducting the procedure were unaware that the valve must be declutched prior to reading the torque switch. Once declutched, the torque switch dial setting was read and was acceptable. The licensee provided training on how to read torque switch dial settings to all the technicians who perform this procedure.

The condition of a sample of motor-operated valves was generally good. One discrepancy was that valve MOV 40-06 in Unit 1 had a stem packing leak. The MOV engineer initiated action to correct this problem.

4.0 CONCLUSIONS

The team concluded that a significant effort is currently underway to address the generic letter. In areas such as design-basis reviews at Unit 2, a significant amount of work had been completed and the quality of the work was good. However, a significant effort remains to complete this program in accordance with the schedule outlined in the generic letter. A focused effort will be required to complete this program at Unit 2 by June 1994.

The control of MOV torque switch settings at Unit 1 is inadequate. A number of valves were identified with torque switch dial settings which were not in accordance with station drawings. The preventive maintenance procedure used to verify torque switch dial settings was inadequate and was not being correctly implemented. The electrical maintenance technicians were not adequately trained in conducting the torque switch dial setting verification step of the MOV preventive maintenance procedure.

5.0 EXIT MEETING

The team met with those denoted in Appendix A on June 26, 1992, to discuss the inspection findings as detailed in this report.

APPENDIX A

Persons Contacted

Niagara Mohawk Power Corporation

* T. Aiken, Elect. Design - Unit 2
  D. Baker, Licensing Program Director
  H. Barrett, Operations Engineer
* S. Chadha, Sr. QA Engineer
* K. Coates, Manager Maintenance - Unit 2
  J. Conway, Mgr. Tech. Support - Unit 2
* K. Dalberg, Plant Manager - Unit 1
* S. Doty, General Supv. Elect. - Unit 1
  J. Dreyfuss, Gen. Supv Ops Support (Acting) - Unit 1
* A. Egap, Nuclear Tech. Program
* J. Evans, MATS
* S. Everett, Maintenance - Unit 1
* C. Fischer, General Supv. Electrical - Unit 1
* D. Greene, Mgr. Licensing
* J. Halusic, Lead Engineer - Mech. Design
* H. Kodali, Engineer Elect. Design - Unit 1
  N. Kollengode, 89-10 Project Manager - Unit 1
* L. Lagoe, 89-10 Project Manager - Unit 2
* R. Main, Maintenance Support - Unit 2
* J. Mancuso, Supv. Ops. Supp. - Unit 2
* M. McCormick Jr., Plant Manager - Unit 2
* M. McGinley, Engineer Mech - Unit 1
  L. Narolis, Sr. Instructor
* J. Neyhard, IST Supv. - Unit 2
* S. Parker, Nuclear Controller
* A. Pinter, Site Licensing Group
* D. Sandwick, Supv. Engineering - Unit 1
  J. Spadafore, Director ISEG
* K. Sweet, Maintenance Manager - Unit 1
  A. Steric, System Engineer - Unit 1
* B. Sylvia, Executive VP
* C. Terry, VP - Nuclear Engineering
* B. Tesonero, Gen. Supv. Outage - Unit 2
  A. Vierling, Mgr. Technology Services
* K. Ward, General Supv. Design - Unit 2
* W. Yaeger, Manager Engineering - Unit 1

U. S. Nuclear Regulatory Commission

* C. Beardslee, NRC Intern
* Dr. P. K. Eapen, Chief, Systems Section
* R. Laura, NRC Resident Inspector

* Denotes present at exit meeting held at Nine Mile Point Power Station on June 26, 1992.

TABLE 1

Licensee Plans and Commitments for Further Program Improvements

	Reference Paragraph
Section 2.1 Scope and Administration of the Program	
• Establish final program scope. (Units 1 & 2)	3
Section 2.2 Design Basis Reviews	
• Document justification for ac undervoltage calculation assumptions. (Subsection 2.2.2)	5
• Document justification for dc undervoltage calculation assumptions. (Subsection 2.2.2)	6
• Include undervoltage for manual valves. (Subsection 2.2.2)	8
• Include temperature effects on ac motors. (Subsection 2.2.2)	9
Section 2.3 Diagnostic Systems	
• Evaluate MUG diagnostic equipment validation results. (Subsection 2.3.2)	2
Section 2.4 MOV Switch Settings and Setpoint Control	
• Disposition DERs for torque switch settings. (Subsection 2.4.1)	2
• Document justification for switch setting calculations assumptions. (Subsection 2.4.2)	2,4,5,6
• Establish a feedback process for dynamic test results. (Subsection 2.4.2)	3
• Complete weak link analysis. (Subsection 2.4.2)	7
Section 2.5 Supplement 3 Response	
• Evaluate industry test results. (Subsection 2.5.1)	2
• Evaluate industry test results. (Subsection 2.5.2)	4
• Justification of capability assumptions. (Subsection 2.5.2)	5

Table 1 2

Section 2.7 Periodic Verification of MOV Capability

• Reevaluation to periodically test motor operated valves following a dynamic test program.	2

Section 2.8 MOV Maintenance and Post Maintenance Testing

• Document position on valve overhauls. (Units 1 & 2)	2
• Document justification stem lubrication selection and frequency. (Units 1 & 2)	3,4
• Develop MOV post maintenance test criteria.	6

Section 2.9 MOV Failures, Corrective Actions, and Trending

• Evaluate the potential for mixed grease. (Units 1 & 2)	4
• Develop a GL 89-10 valve trending program. (Unit 1 & 2)	6

Section 2.11 Industry Experience and Vendor Information

• Evaluate MOVs for hydraulic lock.	4