U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No:	50-255
License No:	DPR-20
Report No:	50-255/99005(DRS)
Licensee:	Consumers Energy Company
Facility:	Palisades Nuclear Generating Plant
Location:	27780 Blue Star Memorial Highway Covert, MI 49043-9530
Dates:	May 3-6, 1999
Inspector:	A. Dunlop, Reactor Engineer
Accompanying Personnel:	T. Scarbrough, Senior Mechanical Engineer, NRR
Observers:	Anna Grant, Atomic Energy Control Board of Canada Brian Finigan, Atomic Energy Control Board of Canada
Approved by:	John Jacobson, Chief, Mechanical Engineering Branch Division of Reactor Safety

EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant
NRC Inspection Report 50-255/99005(DRS)

The purpose of the inspection was to determine whether activities associated with Generic Letter 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves," were sufficient to ensure the continued capability of motor-operated valves. As a result of this inspection, Temporary Instruction 2515/140, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves (GL 96-05)," is closed.

Engineering

- Based on a review of sample motor-operated valves (MOVs), licensee submittals, calculations, test packages, procedures, engineering analyses, trend reports, and condition reports, the inspectors determined that the licensee had established and was implementing a program to provide continued assurance that MOVs within the scope of Generic Letter 96-05 were capable of performing their design-basis safety functions. (Section E1.1)

- Positive aspects of the Generic Letter 96-05 periodic verification program for MOVs were observed, including: (1) trending program for MOVs provided both qualitative and quantitative trending of MOV performance, (2) MOV program was well-documented, and (3) the use of outside personnel on the Nuclear Performance Assessment Department assessment who were knowledgeable of MOVs provided insights into the program and added to the effectiveness of the review. (Section E1.1)

- The valve factor calculations for the dynamically tested MOVs were in error, resulting in calculating non-conservative valve factors. The error in the valve factor calculations was potentially significant in that the valve's calculated thrust margins were non-conservative, however, no operability concerns were identified with the MOVs in question. (Section E1.1)

- The information obtained during the inspection will be applied in the preparation of an NRC safety evaluation on the response of the licensee to Generic Letter 96-05. (Section E1.1)

Report Details

III. Engineering

E1 Conduct of Engineering

E1.1 Implementation of Generic Letter (GL) 96-05, "Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves"

a. Inspection Scope (Temporary Instruction (TI) 2515/140)

Generic Letter (GL) 96-05 requested licensees to establish programs to verify through periodic testing that safety-related motor-operated valves (MOVs) were capable of performing their safety functions within the current licensing basis. Prior to the inspection, the licensee responded to the recommendations of GL 96-05 in letters to the NRC dated November 14, 1996, and March 12, 1997.

A three-phase MOV periodic verification program developed by the Joint Owners Group (JOG) was reviewed by the NRC staff and determined to be acceptable with certain conditions and limitations documented in a safety evaluation report issued on October 30, 1997. In its March 12, 1997 letter, the licensee described an alternative program plan. This inspection evaluated Palisade's alternative plan to determine whether it was consistent with the licensee's commitments and with the recommendations of GL 96-05. The inspection was conducted through reviews of documentation and interviews with licensee personnel. The inspectors selected a sample of MOVs considering dynamic test availability, valve type, and risk significance to evaluate program implementation. The following valves were included:

- MO-1042A Power-Operated Relief Valve (PORV) Block Valve (4-inch Edward double disc gate valve)
- MO-1043A PORV Block Valve (4-inch Edward double disc gate valve)
- MO-3066 High Pressure Safety Injection (HPSI) Stop Valve (2-inch Velan globe valve)
- MO-3080 HPSI Hot Leg Injection Valve (6-inch Anchor Darling flexible wedge gate valve)
- MO-3081 HPSI Hot Leg Injection Valve (6-inch Anchor Darling flexible wedge gate valve)
- MO-3189 Low Pressure Safety Injection (LPSI) Pump P-67B Inlet from Safety Injection Refueling Water (SIRW) Tank Valve (14-inch Aloyco solid wedge gate valve)
- MO-3190 LPSI Pump P-67B Shutdown Cooling Inlet Valve (14-inch Aloyco solid wedge gate valve)
- MO-3198 LPSI Pump P-67A Inlet from SIRW Tank Valve (14-inch Aloyco solid wedge gate valve)
- MO-3199 LPSI Pump P-67A Shutdown Cooling Inlet Valve (14-inch Aloyco solid wedge gate valve)

b. Observations and Findings

Commitments to GL 96-05 (TI 2515/140, Paragraph 03.01)

The licensee indicated in its letter to the NRC dated March 12, 1997, that they had not committed to the JOG program. This was based on a site specific approach to the effects of age related valve degradation and overall MOV health, the small number of valves, and the need to perform plant modifications to be able to meet the dynamic testing requirements of the JOG program. The licensee indicated, however, they would review any JOG recommendations and, if necessary, the test results on which they were based, and incorporate the results of the review into the MOV program.

The licensee's alternative periodic verification plan consisted of a combination of static and dynamic diagnostic testing and periodic maintenance activities. The licensee committed to statically test with diagnostic equipment all 30 MOVs in the GL 89-10 program every three refueling outages or 5 years. In addition, the licensee would continue to dynamically test with diagnostics the 17 MOVs dynamically tested during the GL 89-10 program. This testing would occur every five refueling outages or 8 years unless the MOV margin was less than 25 percent, in which case testing would be performed every three refueling outages or 5 years.

GL 89-10 Long-Term Actions (TI 2515/140, Paragraph 03.02)

In Inspection Report 50-255/96002, the NRC closed its review of the MOV program implemented in response to GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," based on the licensee's actions to verify the design-basis capability of its safety-related MOVs. Five long-term actions in support of GL 89-10 program closure were identified in the report, including: (1) continued review of industry information with respect to valve factors; (2) inclusion of a 5 percent stem lube and valve degradation margin when calculating open thrust requirements; (3) proposed margin improvement plans for low thrust margin valves; (4) the misapplication of industry tested MOV data (mean seat versus orifice diameters when determining valve factors; and (5) not extrapolating open torque measurements when dynamic tests were conducted at less than design basis differential pressure (d/p) conditions. The inspectors verified through review of selected calculations and procedures that actions had been implemented to address the above issues.

GL 96-05 Program (TI 2515/140, Paragraph 03.03)

The licensee summarized its GL 96-05 program of static and dynamic diagnostic testing, preventive maintenance, and trending to provide continued assurance of the design-basis capability of safety-related MOVs in its letter to the NRC dated March 12, 1997. The MOV program was described in detail in EM-28-01, "Motor Operated Valve Program." The procedure included personnel responsibilities, design-basis information, valve operating requirements, MOV switch setting policy, MOV diagnostic testing, post-maintenance testing, corrective actions, personnel training, and operability determinations. Procedure EM-28-04, "Motor Operated Valve (MOV) Periodic Verification and Trending Program," described the licensee's program of periodic

verification, preventive maintenance, and trending to ensure adequate MOV performance in response to the recommendations of GL 96-05. In reviewing the program and implementing documents, the inspectors determined that the MOV program was being implemented in accordance with the licensee's quality assurance program. In addition, the licensee conducted a recent Nuclear Performance Assessment Department (NPAD) assessment of its MOV program with the assistance of MOV personnel from other nuclear power plants. The results of the assessment were documented in NPAD/P-98-006, "Palisades Motor Operated Valve (MOV) Program." This assessment provided continued oversight of the MOV program and identified several issues that were adequately resolved by the licensee. The use of outside personnel on the assessment who were knowledgeable of MOVs, provided insights into the program and added to the effectiveness of the review. The licensee also conducted periodic status reviews of its MOV program, which were documented in the MOV Program Health Assessment. The inspection findings for specific aspects of the MOV program were as follows:

Scope of MOVs Included in the Program

In its letter dated March 12, 1997, the licensee stated that the GL 96-05 program included 30 MOVs (15 gate valves and 15 globe valves). This scope was consistent with the valves under GL 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance." In GL 96-05, the NRC staff recommended that licensee programs consider safety-related MOVs that were assumed to be capable of returning to their safety position when placed in a position that prevented their safety system (or train) from performing its safety function; and the system (or train) was not declared inoperable when the MOVs were in their non-safety position. The licensee indicated that the applicable Limiting Condition for Operation (LCO) of the Technical Specifications was entered when MOVs were placed in their non-safety position. For example, QO-5, "Valve Testing Procedure," required the applicable LCO to be entered when valves MO-3080, MO-3081, or MO-3198 were closed. Based on the sample review, the inspectors concluded that the scope of the MOV program was consistent with the recommendations of GL 96-05.

MOV Design Basis

The licensee had updated the MOV program and calculations in response to new information and design changes. For example, Engineering Analysis EA-GL 8910-01, "Generic Letter 89-10 MOV Thrust Window Calculations," was updated to address recent guidance from the actuator manufacturer on MOV motor actuator output. Based on the sample review, the inspectors concluded that the licensee was maintaining an up-to-date design basis for its safety-related MOVs.

Degradation Rate for Potential Increase in Thrust or Torque Operating Requirements

In its letter dated March 12, 1997, the licensee indicated that the 17 MOVs in its GL 96-05 program that were practicable to dynamically test would be part of an ongoing dynamic test program to determine the effects of age-related degradation on valve operating requirements. The test schedule was staggered so that some MOVs would

typically be tested under dynamic conditions each refueling outage. The MOV Trend Summary Report dated September 28, 1998, documented the results of recent MOV testing and an evaluation of test data for potential age-related valve degradation. The licensee had not established criteria for reassessing the dynamic test frequency based on test results. The inspectors also noted that the procedure for statically testing each MOV immediately prior to dynamic testing could influence the results of the dynamic tests. The licensee indicated that these areas will be addressed as part of its long-term MOV program.

Operating requirements were established for the 13 non-dynamically testable MOVs to bound the effects of potential valve age-related degradation. The thrust requirements for four Crane/Aloyco solid wedge gate valves were described in Engineering Analysis EA-GL-8910-PPM-01, "Determination of Bounding Valve Factors and Required Thrusts for Valves MO-3189, MO-3190, MO-3198 and MO-3199 using the EPRI Performance Prediction Methodology (PPM)." The licensee converted the Electric Power Research Institute (EPRI) PPM thrust requirements to a 0.8 valve factor using the standard industry formula and its assumed valve seat area. The inspectors noted that the current setup for the four Crane/Aloyco valves was slightly lower than specified to achieve a 0.8 valve factor. In response, the licensee demonstrated that the design-basis d/p assumed in the MOV calculations for these four Crane/Aloyco valves could be appropriately reduced to achieve the 0.8 valve factor capability. This was accomplished by not implementing a proposed operational change that would have required the MOVs to open against a d/p. Engineering Analysis EA-GL-8910-05, "Design Valve Factors for Palisades GL 89-10 MOVs," used test data from other industry sources to establish a 0.8 valve factor for seven Velan flexible wedge gate valves. The licensee also established operating requirements for two Edward double disc gate valves used as PORV block valves based on test information from similar valves at other facilities. However, the PORV block valves were modified to be controlled by their limit switches to provide full motor capability with an available 0.9 valve factor. The design of these Edward double disc gate valves was not applicable to the EPRI PPM, but the valve manufacturer indicated that the internal edges of these valves were chamfered to improve their blowdown performance. Further, the PORV block valves remain closed during power operation as specified in SOP-1, "Primary Coolant System."

Based on this review, the inspectors concluded that the licensee had established an acceptable test program for dynamically testable MOVs to identify potential valve age-related degradation. The inspectors also concluded that the licensee had established sufficient operating requirements for MOVs not dynamically testable to bound the effects of potential valve age-related degradation.

Degradation Rate for Potential Decrease in MOV Motor Actuator Output

As described in EM-28-04, the licensee planned to monitor potential degradation in MOV performance through static diagnostic testing of each GL 96-05 MOV. The licensee will also obtain information on MOV motor actuator output during periodic dynamic diagnostic tests of 17 GL 96-05 MOVs. The parameters to be monitored include thrust, motor current, stem friction coefficient, rate of loading, and stroke time, as appropriate. In the MOV Trend Summary Report dated September 28, 1998, the

licensee documented test results and trends for MOV performance, including potential output degradation.

Periodic preventive maintenance was scheduled for GL 96-05 MOVs to help ensure their continued reliable output capability. For example, EM-28-04 specified that the valve stem of each MOV was to be re-lubricated each refueling outage. The procedure also specified that a general mechanical inspection (including grease sampling), an electrical inspection, and an inspection and cleaning of the MOV motor control center breakers were to be performed every other refueling outage.

In condition report C-PAL-98-1387, the licensee responded to the updated guidance on AC-powered MOV motor actuator output provided in Limitorque Technical Update 98-01 and associated Supplement 1. The licensee's review identified reduced margins in the capability of GL 96-05 MOVs to perform their safety functions, however no operability concerns were identified. Plans were established to increase the capability margin of its GL 96-05 MOVs, including reevaluating the available voltage to MO-3189, MO-3190, MO-3198, and MO-3199. Engineering Analysis EA-GL-8910-01 was revised to incorporate the new guidance on motor actuator output predictions. Palisades did not currently have any safety-related DC-powered MOVs that would need to be addressed due to new industry information.

Based on the sample review, the inspectors found that the licensee had established adequate means to monitor the output performance of its safety-related MOVs, including consideration of guidance on motor actuator output.

Periodic Test Method

The licensee planned to conduct periodic static and dynamic testing of its GL 96-05 MOVs to monitor their continued design-basis capability. As described above, the licensee will perform static diagnostic testing of each GL 96-05 MOV and conduct dynamic testing of 17 dynamically testable GL 96-05 MOVs. Those MOVs not dynamically testable were assigned operating requirements to bound potential valve age-related degradation such that only MOV motor actuator output under static conditions would need to be monitored.

The licensee had not relied on MOV risk rankings in establishing the schedule for diagnostic testing of GL 96-05 MOVs. However, licensee personnel indicated that risk insights were informally considered in prioritizing the testing of high safety-significant MOVs. Engineering Analysis EA-MOV-SIG-0499, "Safety Significance Determination of Active MOVs in the IPE [Individual Plant Examination] Model and Results," identified the PORV block valves, and the two trains of HPSI as high safety-significant MOVs. The licensee indicated that the MOV risk rankings had been informally reviewed by operations, systems, and MOV staff, and had been compared to the results of MOV risk ranking at the similarly designed Calvert Cliffs nuclear plant.

Based on the review of test methods and valve setup requirements, the inspectors found that the licensee had established periodic test methods for identifying the

degradation of valve operating requirements and actuator output consistent with the recommendations of GL 96-05.

MOV Performance Evaluation

The licensee evaluated MOV test performance in accordance with Engineering Analyses EA-GL-8910-09, "Periodic Verification of Operating Margin and Extrapolation Justification for GL 89-10 MOVs," and EA-GL-8910-10, "Periodic Verification of GL 89-10 MOV Operating Margins using Static Diagnostic Test Results." The licensee reviewed test results to ensure continued MOV capability and resolved indications of negative design margin. For example, condition report C-PAL-99-0483 addressed the negative capability margin identified for MO-2169 from the results of dynamic testing. In addition, the licensee prepared an MOV Trend Summary Report within 90 days of the completion of each refueling outage or every 2 years (whichever was shorter) in accordance with procedure EM-28-04 to provide qualitative and quantitative trending of MOV performance. The inspectors reviewed the MOV engineering analyses, several condition reports, and most recent trend summary report. The inspectors found the licensee to be monitoring potential changes in MOV operating requirements (such as valve factor and pullout thrust) and actuator output (such as thrust at control switch trip and rate of loading). The licensee recently initiated condition reports C-PAL-99-0496 on potential torque reaction load in globe valves identified by EPRI, C-PAL-99-0528 on missing documentation of MOV diagnostic testing, and C-PAL-99-0560 on incorrect guidance in an MOV test procedure. The inspectors found the licensee's actions taken and planned in these condition reports to be acceptable.

During the inspection, the inspectors identified an incorrect calculation method by the licensee in determining the valve factor from MOV dynamic test results in Engineering Analysis EA-GL-8910-09. The error resulted from the use of design-basis d/p in the valve factor calculation rather than the appropriate d/p from the specific MOV test. Condition report C-PAL-99-0568 was initiated to reevaluate the margins for dynamically tested MOVs in response to the identified error. Although the capability margins of the 17 dynamically tested MOVs were reduced, the licensee did not identify any immediate operability concerns. The licensee was developing a corrective action plan to revise EA-GL-8910-09, EA-GL 8910-10, and other affected plant documents to resolve the incorrect calculation method. The error in the valve factor calculations was potentially significant in that the valve's calculated thrust margins were non-conservative, however, no operability concerns were identified.

The inspectors considered the incorrect method used by the licensee in evaluating MOV dynamic test data to constitute a violation of 10 CFR 50, Appendix B, Criterion III, "Design Control," which required measures shall be established to assure that applicable regulatory requirements and that design basis for those structures, systems, and components were correctly translated into specification, procedures, and instructions. Contrary to the above, Engineering Analysis EA-GL-8910-09 for determining the valve factor for dynamically tested MOVs was in error and established non-conservative valve factors. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Appendix C of the NRC Enforcement Policy. This

violation is in the licensee's corrective action program as C-PAL-99-0568 (NCV 50-255/99005-01(DRS)).

Based on the sample review, the inspectors found that the actions being taken by the licensee and those planned to respond to the NCV will provide adequate evaluation of MOV performance and feedback of MOV information into the GL 96-05 program.

MOV Test Interval

The licensee has established a static diagnostic test interval of 5 years or three refueling outages for all GL 96-05 MOVs, and a dynamic test interval of three refueling outages for dynamically testable MOVs with less than 25% margin and five refueling outages for MOVs with more than 25% margin. The licensee will obtain information on MOV operating requirements and actuator output through this combination of static and dynamic testing. The test schedule would provide MOV performance information over the first 5-year interval. The MOV diagnostic test interval did not exceed 10 years. The licensee demonstrated that dynamically testable MOVs had been set with sufficient margin to provide confidence in their continued capability to perform their safety functions between dynamic tests. For MOVs that were not dynamically testable, the licensee established operating requirements to provide sufficient margin to bound the effects of potential valve age-related degradation. Based on the sample review, the inspectors found that the licensee had justified a periodic test interval that ensures continued MOV design-basis capability until the next scheduled test.

c. Conclusions

Based on a review of sample MOVs, licensee submittals, calculations, test packages, procedures, engineering analyses, trend reports, and condition reports, the inspectors determined that the licensee had established and was implementing a program to provide continued assurance that MOVs within the scope of GL 96-05 were capable of performing their design-basis safety functions. The licensee's trending program for MOVs provided both qualitative and quantitative trending of MOV performance. The MOV program was well-documented. The information obtained during the inspection will be applied in the preparation of an NRC safety evaluation on the response of the licensee to GL 96-05.

The use of outside personnel on the NPAD assessment who were knowledgeable of MOVs provided insights into the program and added to the effectiveness of the review.

The valve factor calculations for the dynamically tested MOVs were in error, resulting in determining non-conservative valve factors. The error in the valve factor calculations was potentially significant in that the valve's calculated thrust margins were non-conservative, however, no operability concerns were identified.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) Violation 50-255/98003-03: Failure to Properly Scope Valves in the Inservice Test (IST) Program. This issue identified that the IST program did not include several valves or identify all the valves required safety functions. The inspectors reviewed the licensee's reply to the Notice of Violation dated June 24, 1998. The valves or additional valves' safety functions were verified to be included in the IST program and the test procedures established were in accordance with American Society of Mechanical Engineers Section XI Code requirements. This item is closed.

X1 Exit Meeting Summary

The inspector presented the inspection results to members of licensee management at the conclusion of the inspection on May 6, 1999. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any material examined during the inspection should be considered proprietary. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

M. Acker, MOV Engineer
P. Donnelly, SA/CA
J. Ford, Manager, Engineering Programs
G. Foster, MOV Program Manager
B. Gambrill, Component Engineering Supervisor
K. Haas, Engineering Director
N. Haskell, Licensing
E. Koepke, MOV Engineer
D. Malone, Licensing
D. Mauck, MOV Engineer
T. Palmisano, Site Vice President
R. Penna, MOV Engineer
B. Roberts, Engineering Programs
D. Rogers, General Manager - Plant Operations
G. Szczotka, Manager NPAD
S. Wawro, Director Maintenance and Planning

INSPECTION PROCEDURES USED

TI 2515/140:	Periodic Verification of Design-Basis Capability of Safety-Related Motor-Operated Valves (GL 96-05)
IP 92703:	Follow up - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-255/99005-01	NCV	Valve Factor Methodology for Dynamically Tested Vales in Error

Closed

50-255/98003-03	VIO	Failure to Properly Scope Valves in the IST Program
50-255/99005-01	NCV	Valve Factor Methodology for Dynamically Tested Vales in Error

LIST OF ACRONYMS USED

AC	Alternating Current
CFR	Code of Federal Regulations
CR	Condition Report
CVCS	Chemical and Volume Control System
DC	Direct Current
DRS	Division of Reactor Safety
d/p	Differential Pressure
EPRI	Electric Power Research Institute
ESS	Essential Service System
GL	Generic Letter
HPSI	High Pressure Safety Injection
IPE	Individual Plant Examination
IST	Inservice Test
JOG	Joint Owners Group
LCO	Limiting Condition for Operation
LPSI	Low Pressure Safety Injection
M&TE	Measuring and Test Equipment
MOV	Motor-Operated Valve
NCV	Non-cited Violation
NPAD	Nuclear Performance Assessment Group
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PORV	Power-Operated Relief Valve
PPM	Performance Prediction Methodology
SIRW	Safety Injection Refueling Water
TI	Temporary Instruction
TRFL	Torque Reaction Friction Load
VIO	Violation

PARTIAL LIST OF DOCUMENTS REVIEWED

The following is a list of licensee documents reviewed during the inspection, including documents prepared by others for the licensee. Inclusion on this list does not imply that NRC team reviewed the documents in their entirety, but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document in this list does not imply NRC acceptance of the document, unless specifically stated in the inspection report.

Procedures

EGAD-EP-01	Inservice Test Program - Valve Test Table, Revision 14, June 30, 1998
EM-09-02	Inservice Testing of Plant Valves, Revision 20, August 28, 1998
EM-28-01	Motor Operated Valve Program, Revision 8, April 23, 1999
EM-28-04	Motor Operated Valve (MOV) Periodic Verification & Trending Program, Revision 3, April 22, 1999
MSE-E-21	VOTES Diagnostic System Operating Procedure, Revision 17, March 2, 1998
QO-5	Valve Test Procedure (Includes Containment Isolation Valves, Revision 54, November 17, 1998
QO-6	Cold Shutdown Valve Test Procedure (Includes Containment Isolation Valves, Revision 32, July 27, 1998
QO-19	Inservice Test Procedure - HPSI Pumps and ESS Check Valve Operability Test, Revision 19, April 23, 1998
SOP-2A	Chemical and Volume Control System, Revision 42, April 15, 1999

Condition Reports

C-PAL-98-1387	Potential for Decreased MOV Capability Due to Issuance of Limitorque Tech Update 98-01, July 15, 1998
C-PAL-99-0483	MO-2169 (CVCS Suction MOV) as left Closed Margin Low, April 20, 1999
C-PAL-99-0496	Effect of Torque Reaction Friction Load (TRFL) on Limitorque Actuator Thrust Ratings, April 22,1999
C-PAL-99-0528	Unretrievable VOTES Test Documentation and Failure to Document M&TE in MSE-E-21, April 28, 1999
C-PAL-99-0568	Calculate Valve Factor from DP Test Results are Non Conservative

Licensing Documents

Palisades Letter to USNRC dated 11/14/96, 60-Day Response to Generic Letter 96-05
Palisades Letter to USNRC dated 3/12/97, 180-Day Response to Generic Letter 96-05
Palisades Letter to USNRC dated 6/24/98, Reply to Notice of Violation

Audits and Assessments

NPAD/P-98-006, Palisades Motor Operated Valve (MOV) Program, November 5,1998

Engineering Analysis/Calculations

EA-MOV-SIG-0499	Safety Significance Determination of Active MOVs in the IPE Model and Results, Revision 0, April 19, 1999
EA-A-PAL-94-279-009	Seismic Analysis and Weak Link Calculation for 12" 1500 Forged Stainless Motor Operated Bolted Bonnet Gate Valve, Revision 0, March 21, 1995
EA-ELEC-MISC-031	Total Temperature for Limitoque Safety Related AC Motor Operators, Revision 2, December 7, 1998
EA-ELEC-VOLT-037	Palisades Degraded Voltage Calculation for the 32 Safety Related MOVs, Revision 2, May 5, 1995
EA-GL-8910-01	Generic Letter 89-10 MOV Thrust Window Calculations, Revision 6, May 3, 1999
EA-GL-8910-DP-01	Consolidated MOV 89-10 Analysis of the Worst Case Operating Scenarios, Revision 0, March 31, 1999
EA-GL-8910-PPM-01	Determination of Bounding Valve Factors and Required Thrusts for Valves MO-3189, MO-3190, MO-3198 and MO-3199 Using the EPRI Performance Prediction Methodology (PPM), Revision 1, April 26, 1999 GL 89-10 MOVs, Revision 3, January 25, 1999
EA-GL-8910-02	Torque Loss Calculation for MOVs at Elevated Temperature, Revision 2, December 5, 1998
EA-GL-8910-05	Design Valve Factors for Palisades GL 89-10 MOVs, Revision 3, January 25, 1999
EA-GL-8910-09	Periodic Verification of Operating Margin and Extrapolation Justification of GL 89-10 MOVs, Revision 4, May 3, 1999
EA-GL-8910-10	Periodic Verification of GL 89-10 MOV Operating Margins Using Static Diagnostic Test Results, Revision 0, April 30, 1999
EA-PLTB-00	Pressure Locking and Thermal Binding Review for Power Operated Gate Valves in Response to Generic Letter 95-07, Revision 3, April 30, 1999

Miscellaneous

MOV Trend Summary Report, 1/97 to 7/98, September 28, 1998
MOV Program Health Assessment, 6/1/98 to 4/15/99