

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No.: 50-255/92014(DRS)

Docket No.: 50-255

License No.: DPR-20

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Palisades Site, Covert, MI

Inspection Conducted: March 24 through April 3, 1992

Inspectors: *[Signature]* 4-28-92
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Materials & Processes Section

Inspection Summary

Inspection conducted March 24 through April 3, 1992 (Report No. 50-255/92014(DRS))

Areas Inspected: Announced safety inspection of the licensee's response to Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve (MOV) Testing and Surveillance" (2515/109) and licensee actions on previously identified items of noncompliance (92701).

Results: No violations or deviations were identified. One open item was disclosed (Paragraph 3.a.(2)(b)).

The licensee demonstrated strengths in the following areas:

- ° The technical knowledge and expertise of the MOV coordinator was exceptional.
- ° Steps taken to address inaccurate actuator information supplied by the vendor were excellent.

- The scope and intent of the self-assessment addressing the recommendations of GL 89-10 were excellent, although followup actions were deficient.

The licensee demonstrated weaknesses in the following areas:

- The program implementation had not shown significant progress for the past two years.
- Evaluation of test data had not started at the time of the inspection.
- Analysis and calculations addressing degraded voltage, design basis requirements, thrust requirements, and thermal overload sizing were not complete at the time of the inspection and may adversely impact the schedule for completion of the program.

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DETAILS

1. Persons Contacted

Consumers Power Company (CPCo)

- # T. Palmisano, Administrative and Planning Manager
- # G. Brock, Electrical Engineer
- # P. Donnelly, Director, Plant Safety and Licensing
- # B. Gerling, Safety Analysis Supervisor
- # J. Kuemin, Licensing Administrator
- K. Osborne, Systems Engineer Manager
- # P. Rigozzi, Training Administrator
- # G. Smith, Systems Engineer
- # B. VanWagner, Systems Engineer
- # E. Zernick, Performance Assessment

U. S. Nuclear Regulatory Commission (NRC)

- J. Heller, Senior Resident Inspector
- # R. Roton, Resident Inspector

Denotes those attending the exit meeting on April 3, 1992.

2. Licensee Action on Previous Inspection Findings (92701)

(Closed) Violation 50-255/89007-03(DRS): Low temperature overpressurization setpoints for MO-27B and MO-27C in the primary coolant system exceeded the technical specification allowable value on several occasions. The inspector's review of the corrective action confirmed that the necessary technical specification change had been processed to preclude a recurrence of the problem. This violation is closed.

3. Inspection of the Program Developed in Response to Generic Letter 89-10

a. Generic Letter (GL) 89-10 Program Review

The NRC inspectors reviewed the commitments contained in the licensee's response submitted to the NRC by letter dated December 20, 1989. No exceptions were taken to the recommendations outlined in the GL.

The NRC inspectors reviewed procedure EM-28-01, "Motor Operated Valve Program" Rev. 0, dated December 19, 1990. The document did not reflect the actual program being implemented at the time of the inspection. For example, the licensee planned to revise all of the "Design Basis DP Documents." However, the program

document referenced only the old dp documents and made no mention of the revisions. Another example was that the program document specified preventive maintenance frequencies of two and four years depending on the type of maintenance performed, while the actual frequencies were every two and four refueling outages, respectively. Revisions to the program document should be made so that the document accurately reflects the program being implemented.

The program implementation had not shown significant progress for the past two years. The inspectors considered the lack of progress for such a sustained period of time to be a weakness.

(1) Scope of the Generic Letter Program

The Palisades plant had a total of 62 MOVs. Sixteen were in the circulating water system and were not safety-related. The inspectors reviewed the engineered safety, chemical volume and control, and auxiliary feedwater systems as a sample check for the completeness of the scope of the GL 89-10 program. No problems were found.

The NRC inspectors reviewed written justification for the exclusion of 12 MOVs from differential pressure (dp) testing and found it to be within the guidelines of the GL with one exception. PORV block valves MO-1042A and MO-1043A were grouped based on dp testing performed on MO-1042A and an extensive dimensional analysis of the two MOVs. The licensee claimed that because the MOVs appeared to be identical, testing of MO-1043A was not necessary. However, industry test data has shown that apparently identical MOVs often do not perform in an identical manner when subjected to design basis testing. Valve MO-1043A should be tested if practicable or justified for exclusion from dp testing in accordance with the recommendations outlined in the GL.

The inspectors determined that the scope of the program was consistent with the guidance of GL 89-10, with the exception of valve grouping.

(2) Design Basis Reviews

(a) Differential Pressure Requirements

Work had not started on updated design basis documents (DBDs) to address maximum operating

conditions. However, the NRC inspectors found the methodology for revising the DBDs to be conservative.

(b) Reduced Voltage Capability

Procedure number EM-28-01, "Motor Operated Valve Program," Rev. 0 stated that degraded voltage was not considered in the design basis calculations because the voltage at the motor terminals was assumed to be greater than 90%, which was consistent with the Limitorque recommendations. However, no engineering analysis was performed to support this assumption. Surveillance Report S-QC-89-07, dated March 9, 1990 identified this to be a deficiency. Corrective actions were not taken at that time, but funding for future analysis was requested prior to this NRC inspection.

The NRC inspectors and the licensee performed separate degraded voltage calculations for a sample of six MOVs to determine actual worst case motor terminal voltages. The results from the two analysis methods agreed within acceptable margins. Four of the calculations showed the degraded voltage values available at the motor terminals to be less than 90% of the nominal 460V rating. The worst case voltage available for MO-3008 was only 60% of the nominal voltage. The licensee committed to perform detailed degraded voltage analysis for all MOVs in the GL 89-10 program at Palisades.

The NRC inspectors found, through calculations, that MOVs MO-0501 and MO-0510 (MSIV bypass valves) may not develop enough thrust under degraded voltage conditions to close during a design basis event (steam line break). Furthermore, during static testing the MOVs appeared to have unusually high stem factors, which may indicate degradation of the stems and/or stem nuts. An analysis was performed to show that the position of the MOVs would be insignificant during the postulated event, however, the portion of the analysis addressing the event at the end of core life (ECL) was not expected to be finished until September 30, 1992 (prior to ECL). This will be considered an open item

pending further NRC review of the completed analysis. (50-255/92014-01(DRS))

The program did not consider the effects of high ambient temperatures on the performance of MOV motors. However, Limitorque was performing testing and analysis to address this issue. Information from the testing should be incorporated into the program when it becomes available.

(c) Completed Design Basis Review

Revised DBDs were not complete at the time of the inspection. However, old DBDs were available for reference which were prepared in response to NRC Bulletin (IEB) 85-03. The NRC inspectors reviewed several of the old design basis documents and found them to be conservative, although lacking in detail. In general, the old DBDs did not address valve mispositioning. The licensee planned to incorporate mispositioning into the new DBDs if the results of the mispositioning appeal, currently being reviewed by the NRC staff, dictates.

(3) MOV Switch Settings

Actuator thrust calculations (used to set torque switches) were not complete at the time of the inspection but were scheduled to be finished by the end of 1992.

The methods for calculating thrust included provisions for adding a 30% margin to the calculated minimum required thrust to account for diagnostic equipment inaccuracies, torque switch repeatability, and MOV degradation. The inspectors indicated that the 30% margin may not be enough to envelop large inaccuracies that may be experienced by the Motor Operated Valve Analysis and Test System (MOVATS) that was used during testing. Steps should be taken to ensure that margins used are adequate.

The licensee planned to use valve factors of 0.4 for flex-wedge gate valves, 0.2 for parallel disc gate valves, and 1.1 for globe valves. A coefficient of friction for the stem/stem nut interface of 0.2 was assumed. These factors are considered to be acceptable provided the

evaluation of test data shows them to be conservative.

Rate-of-loading was not addressed in the program, although an effect from rate-of-loading was apparent in the test data. Additional margin should be added to calculations to envelop this effect, when applicable.

(4) Design Basis Differential Pressure and Flow Testing

The NRC inspectors reviewed the methods for dp testing several MOVs and found them to be conservative.

(5) Periodic Verification of MOV Capability

The plan for periodic verification of MOV capability included static diagnostic testing of MOVs every fourth refueling outage. The period recommended by the GL was every third refueling outage. The licensee committed to change the period to conform with the recommendations of the GL. The NRC inspectors informed the licensee that static testing was not currently an acceptable method of periodic verification because of uncertainties in the performance of MOVs under static and design basis conditions.

In some cases, baseline static testing was performed on MOVs prior to maintenance (a degraded condition), while dp testing was performed after maintenance. The condition of the MOV during a static baseline test should be the same as it was when the MOV was dp tested. Comparing test results after maintenance to baseline test data taken before maintenance makes detection of MOV degradation unlikely. Steps should be taken to ensure that the data taken during baseline testing is meaningful.

Most of the MOVs tested under differential pressure conditions were tested in response to IEB 85-03. Although the testing satisfied the recommendations of GL 89-10, some MOVs were tested as early as 1987. These MOVs may require re-testing in 1992 to meet the schedule for periodic verification.

(6) MOV Failures, Corrective Actions and Trending

MOV failures were reviewed and found to be properly analyzed and documented. The corrective actions were specified and scheduled to ensure completion.

The licensee did not have a program in place to evaluate test data. A program, with definitive acceptance criteria, should be developed to evaluate valve and stem factors experienced during design basis and static testing. The lack of an evaluation program is considered to be a weakness.

(7) Schedule

Fourteen MOVs that still require dp testing were scheduled to be tested within a time frame consistent with the GL. However, at the time of the inspection, the revised DBDs, thrust calculations, degraded voltages calculations and thermal overload (TOL) sizing calculations were not started. The results of the revised DBDs and calculations may require torque switch setting adjustments and/or TOL replacements for a large number of MOVs. Because of this, completion of all the work necessary to close out the GL, within the schedule, may be improbable. The lack of updated design basis analysis and calculations were considered to be a weakness.

b. Associated Programmatic Reviews

(1) Design Control for Thermal Overload Protection

The NRC inspectors reviewed documents that addressed the methods for the design control of TOLs. At the time of the inspection, TOLs were bypassed except for indication purposes. However, the program document noted plans to use TOLs in MOV circuits in the future and to size TOLs based on guidance from IEEE 741-1990. Based on the intentions specified in the program document, design control for TOL protection appeared to be acceptable.

(2) MOV Setpoint Control

The methods for ensuring integrity of setpoint calculations and setpoint control were reviewed. Both the calculation of the settings and the setting of the MOV switches are prescribed in

formal procedures which require authorization by cognizant personnel to institute changes. The record of switch settings is maintained in a controlled document which cannot be changed without proper authorization. The MOV setpoint control program appeared to be protected from unauthorized modification.

(3) Maintenance

Several minor deficiencies were noted during plant walkdowns. Three MOVs were leaking oil from the actuators, two MOVs were oriented such that the spring pack was located below the actuator (which could make hydraulic lock of the spring packs more likely), and one valve stem appeared to be without lubrication. The licensee agreed to evaluate the deficiencies and take appropriate corrective actions where warranted.

The nominal stem lubrication frequency (every two refueling outages) was longer than the 18 month frequency recommended by Limitorque. Furthermore, the frequency was not consistent with the program document which specified the lubrication of MOV stems every 24 months. The licensee agreed to change the frequency of stem lubrication to an interval not to exceed the Limitorque recommendations. The lubrication frequency may be increased in the future if information from various industry testing programs indicates that an extended frequency is warranted.

Testing was not performed after packing adjustments unless the originally specified packing gland torque was exceeded. Test data was presented which showed that the stem load due to packing increased only slightly after adjustment. However, the test data was limited in that testing was only performed on one MOV and neglected the effects of various foreign materials (such as boric acid crystals that may be present at the stem/packing interface) or packing damage (that may occur as a result of a packing leak). The justification for not testing after minor packing adjustments was found unacceptable because of the lack of sufficient test data. The licensee will be expected to develop better justification to support its position or develop plans to test MOVs after minor packing adjustments. Adequate justification may include an engineering evaluation after adjustments to ensure that

substantial margin is available in the event that packing loads are greater than anticipated.

Periodic refurbishment of actuators was not performed. Instead, refurbishment requirements were based solely on trending results from diagnostic test data. Since some forms of degradation are not detectable (in diagnostic data) until the valve is rendered inoperable, trending alone may not be sufficient. A supplemental periodic visual inspection of a sample of MOVs would strengthen the existing program.

(4) Training

The NRC inspectors reviewed course outlines, technical texts, training facilities, training records, examinations, and descriptions of on-the-job training provided to personnel performing work associated with the Palisades MOV program. The MOV training program at Palisades was considered acceptable.

(5) Operating Experience and Vendor Notification

The NRC inspectors reviewed applicable procedures and discussed the process for handling various information notices from different sources. The licensee had taken steps to ensure that information received was screened, evaluated and maintained by appropriate organizations and that appropriate actions were planned. The Palisades program for the processing and control of operating experience and vendor notifications appeared to be acceptable.

Some Limitorque nameplates, and other information documents issued by Limitorque, are known to have inaccurate information. However, steps had been taken to ensure that the information used from these sources was accurate. These steps included a visual examination of actuator parts during refurbishment and a review of motor current traces. Palisades' extensive effort to address this issue was considered to be a strength.

(6) Diagnostics

Palisades currently uses VOTES diagnostic equipment to test MOVs under both static and dynamic conditions. However, most of the

diagnostic testing previously performed used MOVATS diagnostic equipment. MOVATS equipment has come under scrutiny with regard to its published inaccuracies. Since all of the design basis diagnostic testing was performed at or near full flow/dp conditions, the effects of the inaccuracies may be insignificant. However, if degraded voltage concerns arise, the data from MOVATS testing may be necessary to show operability. In these instances, appropriate values for diagnostic equipment inaccuracies should be used.

Most static baseline diagnostic tests (performed in the same general time frame as the design basis dp tests) specified MOVATS diagnostic equipment for data collection. Subsequent static testing specified the use of VOTES equipment. Steps should be taken to ensure that the comparison of data from the two different diagnostic equipment systems is meaningful.

4. Licensee Self-Assessment

The self-assessment in the area of MOVATS was evaluated by review of Surveillance Report S-QC-89-07 dated March 9, 1990. Although other surveillance was conducted on portions of the program, this was the only report dedicated to evaluation of the plant's compliance with the recommendations of GL 89-10. The scope and intent of the effort was excellent in that it compared the program to specific NRC commitments. However, some followup corrective actions were deficient. For example, corrective actions for degraded voltage issues were inadequate.

5. Open Items

An open item is a matter that requires further review and evaluation by the inspector, including an item pending specific action by the licensee. An open item disclosed during this inspection is discussed in Paragraph 3.a.(2)(b).

6. Exit Meeting

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on April 3, 1992. The inspectors summarized the purpose and scope of the inspection and the findings. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such document or processes as proprietary.