U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/86004(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: Covert, MI

Inspection Conducted: January 13-21, 1986

Inspector: P. R. Wohld for 2/6/86
Date

Approved By: W. G. Guldemond, Chief for 2/6/86
Operational Programs Section Date

Inspection Summary

Inspection on January 13-21, 1986 (Report No. 50-255/86004(DRS))
Areas Inspected: Routine, announced inspection of the licensee's inservice test program for pumps and valves, motor-operated valve maintenance procedures, motor-operated valve physical condition, and motor-operated valve test control. The inspection involved a total of 45 inspector-hours onsite and 15 inspector-hours offsite by one NRC inspector. This inspection was conducted under Inspection Procedure 61700.
Results: In the areas inspected, one violation was identified (failure to establish pump vibration limits in accordance with ASME Code requirements - Paragraph 2.b).

DETAILS

1. Persons Contacted

*J. G. Lewis, Technical Director
*R. D. Orosz, Engineering and Maintenance Manager
*J. D. Alderink, Mechanical Engineering and Maintenance Superintendent
E. M. Anderson, Senior Engineer
W. J. Axdorff, General Engineer
G. L. Boyers, Inservice Inspection Supervisor
*P. F. Bruce, Electrical Superintendent
R. A. Fenech, Plant Licensing Administrator
*D. J. Fitzgibbon, Licensing Engineer
*J. K. Ford, Project Engineer
M. E. Foreman, Senior Engineer
C. M. Grady, Plant Maintenance Superintendent
*D. G. Malone, Licensing Engineer
*R. P. Margol, QA Administrator
S. R. Oakley, Senior Engineer
*T. J. Palmisano, Plant Projects Superintendent
*G. W. Sleeper, Plant Safety Engineer
K. A. Toner, Supervisory Engineer
*R. A. Vincent, Plant Safety Engineering Administrator

*Denotes those attending the exit interview held on January 21, 1986.

Additional plant technical and administrative personnel were contacted by the inspector during the course of the inspection.

2. Inservice Testing of Pumps and Valves

This area was the subject of Inspection Report No. 50-255/84-20(DRS) for the period of October 1-19, 1984. The current inspection results indicate that the licensee is continuing to follow the test program in effect during the pervious inspection (with some changes as necessary to correct previously identified problems). The program is generally in compliance with Appendix B of 10 CFR 50, 10 CFR 50.55a(g), and Subsections IWP and IWV of Section XI of the ASME Boiler and Pressure Vessel Code (1977 Edition through Summer 1979 Addenda). The inspection included reviewing administrative and surveillance procedures for inservice testing, reviewing test results and documentation, and discussing the program with onsite personnel administering the program. During the course of the inspection the inspector identified one violation and had specific concerns and comments which are discussed in the following paragraphs.

a. Inservice Testing of Service Water Pumps

In March 1985, service water pump P-7A was dismantled, shaft bearings were repaired, and the pump reassembled and realigned.

This repair work reduced pump vibration from 3.6 mils displacement to approximately 0.5 mils; however, there was no change in pump vibration reference value according to ASME Code requirements. Further evaluation of other pump vibration levels indicated a more general problem with vibration level reference values. This is addressed further in Paragraph 2.b.

The licensee has requested relief from certain inservice test requirements for the safety-related service water pumps. The request is required primarily because there is no flow instrumentation for the service water system from which to establish pump flow reference values; however, the alternate testing and evaluation criteria proposed by the licensee appear inadequate in practice to evaluate pump degradation trends. Vibration and pump head data is too scattered for a variety of reasons to meaningfully evaluate pump operability in the allowable ranges prescribed by the Code.

The inspector recommended that some means of flow reference be established, either by valve lineup or by added flow instrumentation. The licensee indicated that INPO has already recommended improvements in this area and that changes are being considered. The inspector has no further question on this item at this time.

b. Pump Vibration Monitoring

Pump vibration monitoring was reviewed for compliance with Section XI of the ASME Code. The licensee's program appears to meet minimum requirements with the exception that alert and action points representing potentially significant equipment degradation were used throughout 1985 that exceeded Section XI limits. On the average, for the twenty-one safety-related pumps in the program, alert limits used allowed approximately twice the vibration displacement increase over that allowed by the Code. The problem was either with originally selected vibration reference values that were too high, or with reference values that were not re-evaluated and reset according to Code requirements after maintenance. Failure to implement pump vibration reference values, alert level, and action levels in accordance with Section XI of the ASME Code is a violation of 10 CFR 50.55 a(g) (255/86004-01(DRS)).

The inspector noted that the licensee had adequate expertise and physical equipment available to implement a more meaningful vibration test program. At present, however, the emphasis on using this capability has been on non safety-related equipment in the steam cycle. Only three service water pumps of the twenty-one safety-related pumps in the Inservice Test Program are currently under this more sophisticated vibration program. Just prior to the current refueling outage the licensee experienced the seizure of an auxiliary feedwater pump thrust bearing. Had this pump been included in a better vibration monitoring program, data might have

been available to foresee the problem and correct it prior to pump seizure, and, a data history would be available for future use on the same and other similar pumps for maintenance evaluation purposes.

Vibration program improvements recommended by the inspector included:

(1) monitoring all pump radial and thrust bearings instead of limiting monitoring to the inboard radial bearing, (2) monitoring vibration of the drive motor or turbine bearings, (3) measuring vertical, horizontal and axial directions as appropriate, (4) using velocity or acceleration measurements instead of, or, in addition to mils displacement, and (5) periodically observing pump vibration frequency spectrums for signs of change and impending component failure. The licensee's staff noted the inspector's comments in this area and commented that evaluations will be made over the next year on what improvements will be incorporated into the safety-related pump program. The inspector has no further questions on this item at this time.

c. Pump Bearing Temperature Monitoring

Pump bearing temperature monitoring was discussed briefly with the licensee's staff. While it appears that the licensee's yearly bearing temperature monitoring in January of each year meets minimal Code requirements, it appears that the program could be improved significantly for the early detection of bearing mechanical degradation, loss of lubrication, or impaired bearing cooling circuits. These improvements are not required by the Code, but, are at the licensee's discretion. Hence, the inspector has no further question on this item at this time.

3. Limitorque, Motor Operated Valve Maintenance Procedures

The inspector reviewed the following Palisades maintenance procedures to evaluate the instructions provided for setup, adjustment, maintenance and post maintenance testing of valve motor-operators:

Procedure No. MSM-M-26, Revision 0, Limitorque Size SMB-0/2/3 Valve Operator Maintenance

Procedure No. MSM-M-27, Revision 0, Limitorque Size SMB-00 Valve Operator Maintenance

Procedure No. MSM-M-28, Revision 0, Limitorque Size SMB-000 Valve Operator Maintenance

The procedures appeared generally well written and clear. Below are comments discussed with the licensee which the staff understands and has agreed to address in the two or three months following the current refueling outage (except where noted to be addressed by other activities such as in responding to IE Bulletin 85-03).

a. The inspector questioned the adequacy of the post maintenance testing prescribed in the procedures to assure motor-operated valve operability after maintenance is performed. The licensee agreed to sample a number of valves using valve current measurements on a one time basis as an interim means of increasing valve operability assurance.

   Other than this, a more in depth evaluation of needs in this area and additional test program development can be expected to culminate from other licensee activities, including responding to Inspection and Enforcement Bulletin 85-03, efforts in environmental qualification, and response to Inspection Report No. 50-255/85003(DRP) which requires significant maintenance program improvements. (Post maintenance testing is also discussed further in Paragraph 5 which discusses a more general problem with motor-operated valve testing programs.)

b. Torque switch setting ranges are specified by a controlled vendor drawing, M1-NA, Sheets 4-1 and 4-2, and are referred to by torque switch setting instructions in the procedures. Tighter controls should be invoked by either specifying how a valve mechanic is to select a specific torque switch setting within the range, or, by specifying actual setpoints. Precautions are necessary in implementing such controls to assure that valves are not set up in a manner that, for instance, would negate previous testing or previously identified requirements for certain switch settings. This item should be addressed concurrent with activities relating to IE Bulletin 85-03.

c. The torque switch setting list referred to in the procedures and vendor drawing M1-NA, Sheet 4, did not have a listing for size SMB-000 valves 5311 and 5312. Also, Size SMB-2 Valve 3052 did not have a torque range specified. This needs to be corrected.

d. Instructions for setting the geared limit switches are inadequate: 1) to prevent valve back seating, and (2) to properly set the open torque switch bypass switch. This should be addressed in the response to IE Bulletin 85-03. (These procedural weaknesses were verified by physical inspection of the valves as discussed in Paragraph 4.)

e. During a previous visit to Palisades, the licensee indicated to the inspector that all but eight safety-related valves had the open torque switch bypassed by a hard wired jumper; however, the current inspection revealed eight more valves for which this was not the case. Because of this, the inspector requested that the valve schematics be reviewed to be certain which valves had torque and geared limit switch developments different from the norm so that these differences could be addressed by the procedures, as necessary, and in the response to IE Bulletin 85-03.

f. The inspector noted that all three Limitorque maintenance procedures appeared generally appropriate for rising stem type valves but not for non-rising stem types such as butterfly valves which require a ninety degree valve stem rotation. The licensee's staff agreed to review the valve types using a Limitorque operator to assure that the existing procedures are appropriate.

g. If different settings for the open and close torque switches are to be allowed or required on any of the valve operators, instructions need to be provided to assure that the settings for the "open" and "close" torque switches are not reversed. This is particularly true of the "leaf spring" type torque switches on SMB-000 and some SMB-00 operators were the "open" set screw is closest to a prominent "close" label for the close torque switch contacts, and vice versa for the "close" set screw.

h. The licensee is still maintaining heaters for the motor-operators. The inspector questioned whether or not this was necessary. The licensee will check on this.

i. The procedures allow for disassembly of the operator spring pack, but do not appear to adequately warn against this unless absolutely necessary. Failure to reassemble the spring pack properly can result in changing the motor-operator characteristics significantly. The licensee will review the need to add precautions to the procedure and will revise the procedures as appropriate.

Modification of the procedures as noted above is an open item pending completion by the licensee and subsequent inspector review (255/86004-02(DRS)).

4. Limitorque Motor-Operator Inspection

The operators for three auxiliary feedwater valves (MO-0743, 0754 and 0798) were visually inspected, including manual exercising, to evaluate the operators for proper operation. This included an inspection for proper torque and geared limit switch settings. Two potential problems were identified:

a. The open torque switch bypass switches, during a closed to open valve stroke, opened before the valve disc was perceived to accept mechanical load on two of the valves, MO-0754 and MO-0798. The opening appeared to occur simultaneously with disc loading on the remaining valve, MO-0743. This condition is identified as one of the major conditions that led to the failure of similar valves at Davis-Besse and is mentioned in IE Bulletin 85-03.

During a telephone conference on January 29, 1986, the licensee indicated that corrective action would be to hard wire bypass the

open torque switch on all eight auxiliary feedwater isolation valves (MO-0743, 0748, 0753, 0754, 0755, 0759, 0760 and 0798). A 10 CFR 50.59 review is part of the modification package which has included an evaluation (based on vendor information) that even at stall torque for the motor-operator, maximum stress on the valve stem will not exceed two-thirds of the yield stress. Hence, wiring out the torque switch is not expected to result in valve mechanical damage in the event that it might otherwise be called on to protect the valve.

Because of the importance of these valves to open when needed, the licensee committed to complete this activity prior to startup from the current refueling outage. This activity will be followed by the resident inspector to assure completion prior to plant startup; hence, an open item will not be created via this inspection report.

b. The valves appeared to be set to stop in the open direction too close to a valve backseating condition. The valves had been opened by the motor-operator. When an attempt was made to move the valves further in the open direction, no stem motion was observed. Hence, the conclusion was that the valves had either been operated (on motor coastdown) into the backseat, or, it was too close to tell. Since the valves inspected had relatively small motors, it is likely that a number of larger operators, adjusted similarly by procedure, are undesirably back seating their valves stems. This is also an issue raised in IE Bulletin 85-03 and should be addressed in the Palisades response. (This backseating problem is also identified as a procedural weakness in Paragraph 3.d.)

The valve operators, installed in 1979, all appeared to be in good physical condition. Valves installed during original plant construction were not available because of plant conditions and efforts ongoing to perform a containment integrated leak rate test in preparation for plant startup from the current outage.

5. Test Control for Motor-Operated Valves per 10 CFR 50, Appendix B, Criterion XI

Maintenance procedures were reviewed for post maintenance test requirements. No testing or test criteria were identified within the maintenance procedures or other plant procedures that appeared adequate to reasonably assure valve post maintenance operability under design basis conditions. Valve motor currents can provide some measure of valve operability; however, these are not routinely measured and evaluated in the maintenance or surveillance programs.

The licensee currently depends on valve stroke timing per Section XI of the ASME Code for surveillance testing; however, while meeting specific ASME requirements in this area, there are serious weaknesses in the test

techniques and stroke time criteria currently applied. The stroke timing is not normally done at design differential pressures, and test techniques are not adequate to allow an extrapolation of test data to account for the difference between actual test and design basis conditions. Also, stroke time increase limits allowed by the Code are not seen in actual practice prior to total valve failure to stroke.

The inspector suggested that the licensee consider the following:

a. Safety-related motor-operated valves should be periodically stroke timed both open and closed, without initial "prestroking," by measuring the motor "on time" for a full stroke. Times should be measured and compared to a technically meaningful baseline in terms of valve component operability. The allowed variation of stroke time may be increased or reduced based on experience and knowledge.

b. Valve motor current traces during valve stroking in both open and closed directions should be periodically recorded and evaluated for abnormalities. During this stroking, the valve and operator should be observed for proper operation and inspected externally for general condition.

c. In depth testing and test results evaluation for proper operation (including evaluation of valve packing loads, torque switch operation at proper stem thrust loads, and limit switch settings) should be done periodically.

d. During the conduct of Item c, perform a general internal and external inspection of valve operator mechanical condition (electrical connections, oil leaks, bolting, rust, packing leaks, etc.)

The inspector emphasized that this was a suggestion only, and that the licensee should begin a program and improve it based on their experience.

Overall, it appears that the licensee's programs for testing motor-operated valves do not meet the intent of Criterion XI, Test Control, in Appendix B of 10 CFR 50, which states, "A test program shall be established to assure that all testing required to demonstrate that . . . components will perform satisfactorily in service is identified and performed . . . . The test program shall include operational tests during nuclear power plant operation." Resolution of this item is pending further consideration by the licensee and evaluation by the inspector. This is an Unresolved Item (255/86004-03(DRS)).

6. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraph 3.

7. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 5.

8. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) on January 21, 1986, to discuss the scope and findings of the inspection. The licensee acknowledged the statements made by the inspector with respect to items discussed in the report. The inspector 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 documents/processes as proprietary.