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Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

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April 8, 1994

Nuclear Regulatory Commission
Document Control Desk
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**DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT - RESPONSE TO NRC INSPECTION
REPORT 94002, SERVICE WATER OPERATIONAL PERFORMANCE INSPECTION, UNRESOLVED
ITEMS AND WEAKNESSES**

A Service Water System Operational Performance Inspection (SWSOPI) was conducted at the Palisades plant over the period from January 10 through February 11, 1994. The report addressed a number of unresolved issues and weaknesses for which we were asked to provide a response addressing each of these items including our proposed corrective actions. A specific date for providing this response was not requested in the inspection report letter. Discussions with the NRC inspection team leader resulted in agreement on a response date of April 8, 1994.

A project team has been formed as a followup to the SWSOPI Inspection. The team is presently developing a project plan which will at a minimum address completion of the actions identified as followup to the NRC Inspection and a margin enhancement plan for the service water system.

Attached to this letter is the individual responses to each of the unresolved items and weaknesses identified in the March 4, 1994 inspection report.

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Plant Safety and Licensing Director

CC: Administrator, Region III, USNRC
Resident Inspector, Palisades

Attachment

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ATTACHMENT

**Consumers Power Company
Palisades Plant
Docket 50-255**

**RESPONSE TO NRC INSPECTION REPORT 94-002
SERVICE WATER OPERATIONAL PERFORMANCE INSPECTION
UNRESOLVED ITEMS AND WEAKNESSES**

April 8, 1994

SERVICE WATER OPERATIONAL PERFORMANCE INSPECTION
UNRESOLVED ITEMS AND WEAKNESSES

UNRESOLVED ITEMS

Unresolved Item 50-255/92028-03(DRS)

Use of firewater to provide backup water supply for auxiliary feedwater (AFW). The NRC's concern was based on the lack of an analysis or testing to verify the fire water system's capability to provide backup water to the AFW system. The licensee committed to complete an analysis to document the fire water system adequacy under action item request (AIR) A-PAL-92-098.

CPCo Response

As part of the followup to NRC Inspection Report 92028, we were asked to respond within 60 days of the date of the report, to Unresolved Item 3. Our March 29, 1993 letter to the NRC provided our plans for completion of the follow-up actions for this unresolved item. In summary, based on engineering judgement we believe that the fire water pumps and interconnecting system can provide the needed water to the auxiliary feedwater pumps suction. Action Item Record A-PAL-92-098 was written to provide an analysis demonstrating the ability of the fire water system to provide backup to the Auxiliary Feedwater Pumps. The target date for completion of the analysis is December 15, 1994.

Unresolved Item 50-255/94002-01

The team identified the lack of over-pressure protection for CCW heat exchangers (HX) E-54A and E-54B. The concern involved over-pressure due to thermal expansion stemming from service water valve isolation. Palisades's ASME Code of record required each vessel to be protected from any conditions specified in the certified design specification. The code further required to document the degree of over-pressure protection in a summary technical report. The licensee was unable to retrieve the summary technical report that justified the lack of over-pressure protection prior to completion of the inspection. The licensee committed to locate the report or perform the technical analysis to show Code compliance.

CPCo Response

We have requested the original plant architectural engineer to complete a final search for the code-related documentation for the CCW heat exchangers by May 6, 1994. If the search is successful, we will review the documentation for acceptability. If this search is unsuccessful, a summary technical report documenting whether over-pressure protection is needed will be completed. The issue of documentation for the over pressure protection of the CCW heat exchanger will be completed by June 15, 1994.

Unresolved Item 50-255/94002-02

The results of tests, calculations and engineering evaluations were inconclusive and could not be used to determine if the SWS would fulfill its safety related function at elevated lake water temperatures combined with other adverse design basis conditions.

The licensee concluded that the SW and CCW systems were currently operable because current lake water temperatures were less than 50°F. This temperature provided significant margin to account for all issues impacting the SW operability margin. The licensee committed to resolve the following issues, documented in DR D-PAL-93-272, by mid April 1994.

- A. Neither test results or design basis calculations accounted for instrument uncertainties.
- B. The analyses that develop required flow rates to HXs served by the SWS used only the original design fouling. No calculations had been performed to evaluate degraded HX performance resulting from fouling beyond the original design value.
- C. The most limiting system lineup may not have been tested.
- D. The impact of increased SW temperatures and reduced SW flow rates on the SW and CCW design pressures and temperatures and systems' operation was not evaluated.
- E. The root cause of declining flow rates to control room chillers VX-10 and VX-11 had not been determined.
- F. As discussed in Section 8.1, the SW pump IST reference values and pump degradation was not coupled to the required system performance.
- G. The elevated lake water temperature was not incorporated into the maximum allowable SW system degradation.

Pending the licensee's completion of all the actions impacting SWS margin documented in DR D-PAL-93-272 and review by the NRC, this is considered an unresolved item (50-255/94002-02).

CPCo Response

We have made an operability determination, as documented in D-PAL-93-272, which concludes that plant operation up to 50°F lake temperature is acceptable. A review of historical plant records show that the temperature of Lake Michigan begins to approach a nominal temperature of 50°F during the first part of May.

The lake temperature limit of 50°F is being tracked on the plant Limiting Condition for Operations (LCO) control board in the shift supervisors office which tracks conditions which effect plant operability. As the evaluations listed below progress and issues and uncertainties are better understood, the operability determination may be revised. Such operability determinations will be documented in an engineering analysis and subjected to appropriate technical reviews. As a result, the target completion dates to attain a maximum SWS inlet temperature may be changed accordingly.

- A. Action will be taken to account for instrument uncertainties associated with the SWS and CCW testing in an overall reanalysis of the systems through corrective action D-PAL-93-272. The target date for completion of the action is May 8, 1994.

An additional action to evaluate the link between analysis inputs and assumptions used in testing practices will also be completed under corrective action D-PAL-93-272 and is targeted for completion by August 1, 1994.

- B. An evaluation of appropriate fouling factor assumptions made in heat exchanger performance calculations will be completed. The evaluation will determine appropriate fouling factors based on Tubular Exchanger Manufacturers Association (TEMA) recommendations for existing service conditions, plus a review of existing maintenance and testing practices to determine where degraded fouling assumptions may be appropriate. The target date for completion of the corrective action is May 8, 1994.
- C. An evaluation to assure that the most limiting system hydraulic lineup is considered in our analysis will be conducted under D-PAL-93-272. The current date for completion of the corrective action is May 8, 1994.
- D. An analysis to evaluate the impact of the elevated SWS and CCW temperatures on system design ratings and performance will be completed as corrective actions under D-PAL-93-272. The target date for completion of this corrective action is May 8, 1994.
- E. A corrective action has been initiated under D-PAL-93-272 which requires system engineering to determine and correct the cause of the reduced flow to VC-10 and VC-11. The present plan to accomplish this action includes a boroscope inspection of the subject service water piping to verify the piping is not fouled. We will also be looking at the instrumentation for accuracy issues and tubing silting problems that may be contributing to this apparent low flow scenario. Based on these results, actions correcting the deficiencies will be taken. These actions will be completed during the 1995 refueling outage.
- F. A corrective action has been initiated under D-PAL-93-272 to develop reference values for SWS pump testing (IST) which are related to the design basis and accident analysis. The corrective action includes

revision as necessary of the appropriate test procedures. The target date for completion of this corrective action is June 15, 1994.

- G. Reanalysis of the SWS performance will ensure that the appropriate maximum SWS inlet temperatures are evaluated along with the maximum expected system degradation. This analysis will be completed as a corrective action under D-PAL-93-272. The target date for completion of the corrective action is May 8, 1994.

Unresolved Item 50-255/94002-03

Corrective actions in response to D-PAL-93-272 will complete the development of SWS pump testing reference values and required system performance. Additionally, the licensee intended to review the basis for IST reference values and allowed degradation for all Section XI pump tests to ensure that they were adequately coordinated with safety analysis performance criteria. This issue is considered an unresolved item pending the licensee's review to determine impact on the IST reference values and the possible effect on past ESS pump operability.

CPCo Response

As noted in response to Unresolved Item 50-255/94002-02 Item F, a corrective action has been initiated under D-PAL-93-272 to develop reference values for SWS pump testing which are related to the design performance.

A corrective action was written under D-PAL-93-272 to develop a basis for reference values for all safety related pumps in the Inservice Test Program which are directly related to the design basis and accident analysis. The corrective action requires revision, as necessary, of the appropriate test procedures. After the ISI pump reference values are determined, reviews will be completed to determine the affect, if any, on past ESS pump operability. The target date for completion of the corrective action is August 1, 1994.

WEAKNESSES

NRC Identified Weakness

The NRC inspectors ran several scenarios on the plant simulator. The first scenario required the crew to isolate SWS critical header A to stop a leak.

The SWS critical header A leak, which was located in the CCW pump room, was not isolated until 30 minutes after the event was identified by the crew. This created the potential for flooding of the CCW pump room.

Because procedure ONP 6.1, "Loss Of Service Water," Revision 5, did not contain any specific guidance to isolate the leak, operator aid (OA) 136 was

used to determine which valves should be closed to determine leak location. OA 136 was a SWS simplified schematic that was attached to the control panel. Although the crew successfully isolated the SWS leak, identified leak location, and determined the impact on plant operation, the team considered the delay to complete leak isolation actions a weakness.

CPCo Response

The simulator scenario consisted of a service water line leak in the CCW Room on the 'A' Critical Service Water Header. The crew suspected a service water system leak when the SWS standby pump started and critical service water system header pressures dropped significantly. The Shift Supervisor subsequently ordered an emergency down power, however during the down power, the plant was tripped due to voltage regulator problems. While the crew commenced EOP 1.0, "Standard Post Trip Actions," immediate actions a LOCA event was initiated. Shortly after completing EOP 1.0, the LOCA was identified and the crew focused their immediate priorities on the LOCA since the service water critical header pressures remained above the Safety Function Status Check Acceptance Criteria of 42 psig. After sufficient action was taken on the LOCA, the crew re-directed their efforts to isolating the SWS leak which was approximately 30 minutes later.

The following actions will be performed to enhance operator response in identifying SWS leaks:

1. We will enhance ONP 6.1, "Loss of Service Water," to effectively proceduralize a leak isolation process. However, the procedure will be changed only if we are sure that the probability of misleading/misdirecting efficient leak isolation efforts is low.
2. Additional simulator training will be completed on ONP 6.1, "Loss of Service Water."

NRC Identified Weakness

This weakness was identified in the licensee's operating procedures.

SOP 16, Steps 5.1.2 and 7.6 prevented initiation of backup cooling from the SWS to the ESS pumps if normal cooling from CCW was lost concurrent with an SI signal. Procedure compliance would prohibit opening the SWS valves to the ESS pumps with the CCW valves open. The CCW valves would remain open until the SI signal could be reset. Current procedural compliance results in loss of cooling water to the ESS pumps.

The licensee indicated that the procedure would be revised to allow opening the SWS valves to the ESS pumps if the CCW valves were open and an SI signal was present. A CAUTION preceding step 7.6 would also be added to alert the operator that CCW would drain to Lake Michigan with a resultant loss of CCW

system functions, if SWS cooling to the ESS pumps was aligned with either CCW valve open.

CPCo Response

SOP 16, "Component Cooling Water (CCW) System Procedure," Step 7.6 provides an option of supplying service water to the ESS pumps with a loss of CCW cooling supply. This section required closure of the CCW supply and return valves prior to opening the SWS supply and return valves. A precaution, Step 5.1.2, also noted that the CCW supply and return valves shall not be open when the SWS supply and return valves are open since this would allow CCW system water drainage to the lake. The precaution could have been interpreted as an environmental issue only. The procedure also did not adequately address the case when an SIAS signal was present and the CCW supply and return valves could not be closed.

The following actions will be performed to correct this procedural weakness:

1. A caution was added to SOP 16, Section 7.6, identifying the inability to close the CCW supply and return valves with an SIAS signal. The caution also indicates that if the service water cooling option is performed, the CCW system will drain to the lake and CCW cooling to other plant equipment would be lost. This action is completed.
2. SOP 16, Step 5.1.2 was revised to clearly identify the result of draining the CCW system to the lake. This action was completed.
3. SOP 16, Sections 7.6 and Step 5.1.2 will be revised in accordance with the engineering resolution for resolving the single failure concern. This action will be completed after engineering resolution of the single failure vulnerability of the CCW system.

NRC Identified Weakness

This weakness was identified in the licensee's operating procedures.

SOP 15, "Service Water System," Revision 7, Step 4.1.2 contained a similar statement as described above. The licensee indicated that this procedure would be revised.

CPCo Response

The SOP 15, Revision 7, Step 4.1.2, requirement coincides with the requirement of SOP 16, Step 5.1.2.

SOP 15, Step 4.1.2 will be revised in accordance with the engineering resolution for resolving the single failure concern. This action will be completed after the engineering resolution of the single failure vulnerability of the CCW system.

NRC Identified Weakness

This weakness was identified in the licensee's operating procedures.

Annunciator Response Procedure (ARP) 7, Window 29, "Service Water Bay Low Level," did not provide guidance regarding what level SW pumps should be tripped if SW bay level was decreasing. This item was previously identified during the licensee's SSDC conducted in May 1990. The licensee indicated that the procedure would be revised.

CPCo Response

ARP 7, Window 29 will be revised to provide clearer directions to operators for tripping the service water pumps.

NRC Identified Weakness

This weakness was identified in the licensee's operating procedures.

ONP 6.1, Revision 5, Attachment 1, "Alternate Method of Supplying the Intake Structure," required tripping the SW pumps if warm water recirculation pump (P-5) was used to supply water to the intake structure. This did not coincide with SOP-14, "Circulating Water and Chlorination Systems," Revision 16, step 7.13.1, which provided steps to supply the intake structure from P-5 but did not require tripping the SW pumps.

The licensee indicated that guidance for tripping the SW pumps would be incorporated into the appropriate ARP and removed from ONP 6.1, Attachment 1. No revisions to SOP 14 were deemed necessary.

CPCo Response

ONP 6.1, Revision 5, Attachment 1, was developed on the assumption of a collapsed intake piping or crib. The result of such a collapse would be an immediate emptying of the intake pump bay, therefore, the procedure ensured that the SWS and dilution water pumps were tripped off. SOP 14, Step 7.13.1 was developed as a warm water supply to melt ice off the traveling screens, which does not necessarily require tripping of the SWS or dilution water pumps.

The following actions will be performed to correct this procedural weakness:

1. ONP 6.1 has been revised to require tripping of the dilution water pumps only based on water conservation for the SWS system.
2. The ARP 7 will be revised to provide direction when the SWS and dilution water pumps should be tripped off.

NRC Identified Weakness

The team identified non-seismically constructed scaffolding, installed in the west safeguards room over safety-related equipment. The licensee performed an engineering analysis, which concluded that the scaffolding did not meet the requirements of procedure MSM-M-43, "Scaffolding," Revision 0, but was not a safety concern. The licensee removed the scaffolding and initiated a revision to MSM-M-43 that provided additional instructions for scaffolding in safety-related areas. The revision would include walkdown inspections, supervisor sign-off for installation, clarification of requirements, and approval and justification by the system or assigned engineer for deviations from the procedure. The team considered this action acceptable.

CPCo Response

On January 20, 1994, NECO Civil Engineering performed an analysis for scaffolding and concluded the scaffolding did not meet the requirements of Procedure MSM-M-43. However, the scaffolding did not reflect a safety concern. On January 21, 1994, plant maintenance personnel performed a walkdown and found only one other scaffold installed in the plant. The installed scaffold met the installation requirements of procedure MSM-M-43 and there was no safety-related equipment involved. On January 22, 1994, plant maintenance repair workers dismantled and removed the scaffolding from the West Engineering Safeguards Room.

As a result of this event the following corrective actions will be taken:

1. Procedure MSM-M-43 will be revised to include (1) instructions for walkdown inspection for scaffolding installed in safety-related areas; (2) a supervisor sign-off for scaffolding installed in safety-related areas; and (3) to clarify requirements (for free-standing, separation distances, braced scaffold, etc.) as they relate to requirements for scaffolds installed in safety-related areas.
2. Responsible maintenance supervisors will be informed of the requirement that any deviations from the Procedure MSM-M-43, with regard to general scaffolding requirements and requirements for scaffolds in safety-related areas, require approval and justification by engineering before the scaffolding can be accepted for use.
3. Training will be provided for Plant Maintenance Supervisors on their responsibilities under permanent Maintenance Procedure MSM-M-43.

NRC Identified Weakness

The team identified that a ground strap was not connected on an recently replace containment spray pump motor. DR D-PAL-94-017, evaluated the problem and concluded that the work package instruction lacked the detail necessary to ensure the ground strap connection. The package also contained other minor

discrepancies as well. The licensee connected the ground strap and was developing corrective actions for the other minor deficiencies. The team considered this action acceptable.

CPCo Response

The root cause of the condition (unconnected ground strap) described on Deviation Report (DR) D-PAL-94-017 can be attributed to an inadequate job plan on Work Order (WO) 24202957. This WO plan did not contain sufficient detail to ensure that the work would be done properly. A procedure exists (ESS-E-36) that contains detailed steps concerning the re-connection of the ground strap on the motor, EMA-1114. While there is no requirement to use this procedure for the replacement of the motor, the WO plan should contain an equivalent amount of detail.

While reviewing the WO package and related documentation, the following discrepancies were also noted and corrective actions will be assigned to address them as well.

1. The WO plan called for motor removal, shipment for refurbishment, and reinstallation of same motor. The spare motor from stock was used due to problems during refurbishment of the removed motor and the WO plan was not revised to reflect the subtle differences between the spare motor and the one that had been removed from the pump.
2. The Work Instruction (WI) WI-SPS-E-02 data sheet was not properly filled out, in that the motor serial number was not listed as required.
3. Procedures ESS-E-36 and MSE-E-5 require the procedure and all attachments to be filed in DCC (i.e., filmed). The WO package was purged of these sheets prior to closeout and therefore this requirement was not met.
4. Several entries on the WO summary as well as a signature in FHS-M-23 did not contain dates.
5. The WO package did not contain the issue ticket for the Raychem cable splices used during the reconnection of the motor.
6. The equipment database has not been revised to reflect the serial number of spare motor that was installed.
7. The radiation hot work permit does not provide a box to be checked that covers the use of a torch for heating.
8. Torquing of the motor hold down bolts was signed as performed on July 10, 1993 and verified on July 11, 1993. This activity was in fact performed on July 11, 1993.
9. Step 9 of the WO plan contained a double verification that the WO summary shows was performed on July 8, 1993 but was signed July 19, 1993.

Corrective Actions

1. The evaluation of this investigation (D-PAL-94-017) and its associated WO will be reviewed with members of the maintenance department specifically addressing items 1, 2, 4, 5, 8, and 9 listed above.
2. The practice and control used to revise the database when a spare motor is installed will be evaluated to determine if current practice is acceptable or if the method should be modified to ensure timely database update.
3. An assessment will be completed to review the need to revise the hot work permit form to include a box to be checked to address heating with a torch.
4. All permanent maintenance procedures will be reviewed to determine which ones require the filming of all attachments. Those permanent maintenance procedures whose filming requirements need to be clarified, will be revised following the review.

NRC Identified Weakness

The team found that the licensee had not fully evaluated the susceptibility of SWS instrument line fouling. Specific flushing requirements had only been implemented for instruments that had been clogged in the past; however, walkdowns of SWS pump discharge lines found that instrument lines to pressure switches for standby pump starting had long stagnant horizontal runs that might be subject to fouling. These lines were not checked by periodic maintenance or surveillance. Also omitted were stagnant lines to and from the former control room air conditioners. This was not consistent with the GL intent, which recommended licensees establish routine maintenance of SWS piping and components to ensure that silting and bio-fouling could not degrade system performance. The licensee committed to review the maintenance of these and other instrument lines.

CPCo Response

It is apparent that the original Generic Letter 89-13 effort did not address all instrument lines. During the Palisades SWOPI inspection the NRC Information Notice 94-003 was issued. The Information Notice entitled, "Deficiencies Identified During Service Water System Operational Inspections," notifies licensees of concerns regarding instrument tubing becoming fouled with silt and acknowledges that this issue should have been better addressed by the Generic Letter 89-13 implementation. We will review the specific issues in the Information Notice to see how those issues apply to Palisades,

and incorporate actions as needed in our preventative maintenance program to ensure that tubing doesn't become fouled. The review of the Information Notice and any corrective actions needed will be completed by the end of the 1995 refueling outage. An AIR, A-PAL-94-009, was initiated to assure that the issue of the stagnant lines to and from the former control room air conditioners is addressed under the Generic Letter and Information Notice 94-004 guidelines.