



**Consumers  
Power**

**POWERING  
MICHIGAN'S PROGRESS**

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

**David W. Rogers**  
*Plant Safety and Licensing Director*

March 10, 1994

Nuclear Regulatory Commission  
Document Control Desk  
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT - REPLY TO NOTICE OF VIOLATION - NRC INSPECTION REPORT No. 93026

NRC Inspection Report No. 93026, dated November 24, 1993, forwarded the results of a special unannounced safety inspection in the electrical design control area. The inspection report identified an apparent violation of NRC requirements pertaining to the operability of engineered safeguards room cooler fans and containment high pressure and containment high radiation actuation relays. The NRC's February 9, 1994 letter contained the Notice Of Violation for these two situations.

Our reply to the Notice of Violation is provided in the attachment to this letter.

David W. Rogers  
Safety and Licensing Administrator

CC Administrator, Region III, USNRC  
NRC Resident Inspector - Palisades

Attachment

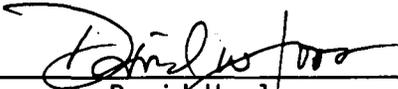
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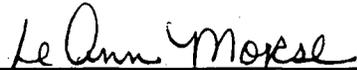
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CONSUMERS POWER COMPANY

To the best of my knowledge, information and belief, the contents of this  
submittal are truthful and complete.

By   
David W. Joos  
Senior Vice President  
Nuclear, Rates and Marketing

Sworn and subscribed to before me this 10 day of March 1994.

  
Le Ann Morse, Notary Public  
Berrien County, Michigan  
Acting in Van Buren County

[SEAL]

My commission expires: February 4, 1997

ATTACHMENT

Consumers Power Company  
Palisades Plant  
Docket 50-255

REPLY TO NOTICE OF VIOLATION;  
NRC INSPECTION REPORT No. 93026

March 10, 1994

## REPLY TO NOTICE OF VIOLATION

### NRC VIOLATION - INADEQUATE DESIGN CONTROL MEASURES APPLIED TO CHANGE THE ENGINEERED SAFEGUARDS ROOM COOLER FAN MOTOR THERMAL OVERLOADS

- I. 10 CFR Part 50, Appendix B, Criterion III requires in part that design control measures shall provide for verifying or checking the adequacy of design, including necessary design reviews, calculational methods, or performance of a suitable testing program.

Contrary to the above, on May 3, 1993, the design control measures applied to change the engineered safeguards room cooler fan motor thermal overloads were inadequate. Specifically, the trip setpoints were set at or below the normal operating current and there was no adequate design review nor suitable testing to check the adequacy of the design. Consequently, during the period from May 16 to June 5, 1993, the reactor was critical with the safeguards room cooler fans inoperable and incapable of performing their design function. This degraded the operability of ECCS and containment cooling equipment such that those safety systems could not have performed their intended function under certain conditions, in this case, absent prompt manual actions including trouble shooting and repairing the engineered safeguards room cooler fan motor thermal overloads.

### CPCo RESPONSE

#### Admission of the Violation

Consumers Power Company agrees with the alleged violation and has paid the civil penalty via letter dated February 28, 1994.

#### Reason for the Violation

The cause of the violation is attributable to (1) inadequate design control, (2) failure to confirm a design assumption in the calculation which was used as input to the setting specification, and (3) inadequate post maintenance testing. The analysis of this event is documented in Licensee Event Reports LER 93-008, submitted September 24, 1993, and LER 93-008-01, submitted November 24, 1993.

#### Corrective Actions and Results Achieved

- A. The thermal overload settings for all four of the engineered safeguards room cooling fans were reanalyzed, revised, and tested. The new settings were implemented using the specification change process which received a multi-disciplinary design review.

- B. Eight other thermal overload setting changes had been made using a "T-Frame" criteria ("T-frame" motors with a service factor of 1.0 using a Cutler-Hammer No. 789 relay). These setting changes were reviewed and it was found that the measured equipment running current was sufficiently below the overload setting.
- C. Additional thermal overload setting changes and breaker changes made during 1993 (approximately 40), other than the twelve "T-Frame" motors mentioned in corrective steps A and B above, were reviewed to ensure appropriate post maintenance testing was performed.
- D. A review of all 480-volt safety related motors at Palisades where thermal overload heaters are applied was completed including a measurement of running load amps (RLA). Adequate operability margins were verified for each motor by comparing the RLA at reduced voltage to the lowest possible heater trip setting. Safety related motor operated valves were not reviewed as part of this effort since the thermal overloads for these motors are wired to annunciate only, not to trip the motors.
- E. To provide confidence in our setting specification methodology, a circuit protective device setting specification was requested from an independent design engineering organization for the engineered safeguards room fan motors and for five other power circuit protection schemes installed in the plant. This independent specification for the engineered safeguards room fan motors confirmed the preference for H1046(A) heaters which were ultimately installed as described in A above. The independent specifications for the other protection schemes identified no other inadequate settings or inappropriate setting methodology.
- F. All setting sheet changes after November 2, 1993 are to be completed using the specification change procedures of the plant modification and design control process. Also effective after November 2, 1993, specification changes affecting safety related equipment or having the potential for impact on plant availability, are to be submitted to a multi-disciplinary design review effort as is typically conducted for facility changes. The multi-disciplinary design review requires a dedicated design review team meeting. The purpose of the meeting is to assure a collective understanding of design purpose, proposed configuration, and physical and functional design requirements to be verified and assures that proper verification test methods are specified for determining operability.
- G. Internal correspondence with suggestions and considerations for appropriate post maintenance testing for implementation of setting sheet changes was completed and forwarded to the Electrical Maintenance Department. Administrative Procedure 5.19, "Post Maintenance Testing," Revision 2, dated February 11, 1994, incorporated this guidance.

- H. Analyses were completed which evaluated the potential effect on the safeguards equipment assuming the safeguards room cooling fans failed to function during a postulated accident. The analysis indicates that the effect of the loss of the engineered safeguards room cooling fans indicate that the temperatures in the east and west safeguards rooms would continue to rise during the post accident condition following the onset of recirculation of the containment sump. It takes several days for the environmental qualification temperature of the most vulnerable equipment to be affected.
- I. The results of a multi-discipline review group's root cause analysis of this and other recent design deficiencies was the subject of quarterly technical staff training for engineers and work planners. The completed training focused on the use of the formal design change process for implementing plant changes such as changes to circuit protective device settings, the need to validate assumptions used in design such as expected values of normal running current, and the need for valid and comprehensive post modification testing.

#### Corrective Action to Avoid Future Non-Compliance

A multi-discipline group was formed to review this event and others involving electrical design or modification. The multi-disciplinary group identified plant activities that could result in the implementation of design changes without proper design change controls. In particular, the review of maintenance and system engineering activities found that some activities had been implemented through the work order process which may be design changes. Operability determinations were performed if safety related equipment was affected. However, these determinations concluded that existing plant conditions are acceptable. The possible design changes occurred in less than 1% of approximately 1350 work orders reviewed. Longer term actions in the area of design control compliance to avoid further violations are ongoing and include the following:

- A. Engineering performance improvement initiatives are being defined and scheduled. These initiatives reflect needed improvements in the area of management and leadership, prioritization and planning, safety culture and teamwork, assessment and human performance. These engineering initiatives are being integrated into an overall Palisades Performance Improvement Plan.
- B. By June 1, 1994 revisions to appropriate design control procedures will be completed outlining the requirements for a multi-disciplinary design review for all modifications affecting safety related equipment or having the potential for impact on plant availability.

- C. By October 1, 1994 a review of protective device setting methodology and setting sheet implementation from a design control perspective will be completed to determine if any other weaknesses exist. Appropriate changes to existing design controls and protective device methodology will be implemented as required. The effort will include the review of our system protection setting methodology by an experienced engineering consultant. In addition, an engineering design guidance document will be developed for specifying circuit protective device settings.

#### Date of Full Compliance

Full compliance has been achieved.

#### NRC VIOLATION - INADEQUATE DESIGN CONTROL MEASURES FOR THE SELECTION AND REVIEW FOR SUITABILITY OF PARTS, EQUIPMENT, AND PROCESSES ESSENTIAL TO SAFETY RELATED FUNCTIONS

- II. *10 CFR 50, Appendix B, Criterion III, requires in part that design control measures shall be established for the selection and review for suitability of application, of parts, equipment, and processes essential to safety related functions.*

*Contrary to the above, as of August 4, 1993, design control measures established for the selection and review for suitability of parts, equipment, and processes essential to safety related functions were inadequate. Specifically, in 1990 containment high pressure and containment high radiation relays, equipment essential to safety related functions, were selected such that relays with nine or more normally closed contacts had an inadequately sized closing coil for operation under design conditions involving seismic events or minimum electrical voltage. As a result, from the 1990 refueling outage until August 4, 1993, the containment high pressure and containment high radiation actuation systems were not capable of performing their intended safety functions under certain design basis conditions, i.e., seismic events or minimal electrical voltage conditions.*

#### CPCo RESPONSE

#### ADMISSION OF VIOLATION

Consumers Power Company agrees with the alleged violation.

### REASONS FOR VIOLATION

This violation occurred as a result of an original plant design deficiency. While it is true that improperly qualified relays were installed in the containment high pressure (CHP) and containment high radiation (CHR) circuits during the 1990 refueling outage, the newly installed relays were the same model number relay and coil and the contacts were configured the same as the existing original plant construction relays. This deficiency was perpetuated by procurement and installation of identical replacement relays. The relay replacement qualification, also, was not adequate.

Procurement of safety related equipment involves:

1. Identification of critical design characteristics
2. Identification of tests and/or analysis to verify that these critical design characteristics are satisfied
3. Comparison of test results to acceptance criteria and/or review of analysis to ensure all critical design characteristics have been met.

Procurement of these relays failed to completely identify all critical design characteristics and, thus, system and component interface deficiencies were not identified. A contributing cause was the lack of mechanical loading factor information which would have identified the number of normally closed contacts as a critical design characteristic. However, if the relays had been tested in the configuration in which they were to be installed and proper acceptance criteria had been identified, testing of the relay would have identified the system/component interface deficiencies.

The analysis of this event is documented in Licensee Event Report LER 93-012, submitted November 24, 1993.

### CORRECTIVE ACTIONS AND RESULTS ACHIEVED

1. The original test relay was retested to ensure the CHP and CHR relays configured with eight or less normally closed contacts would perform their function under all design parameters.
2. The original test relay was tested with a more powerful coil installed to ensure the CHP and CHR relays configured with nine, ten or eleven normally closed contacts would perform their function under all design parameters.
3. New more powerful coils were installed in CHP and CHR relays configured with nine, ten or eleven normally closed contacts.

4. A note was added to the CHP and CHR electrical schematic diagram to indicate which coil must be installed depending upon the configuration of the relay.
5. Stock descriptions and the equipment data base for all CHP and CHR relays configured with nine, ten or eleven normally closed contacts were revised to indicate these relays require the more powerful coil.
6. The vendor information explaining mechanical loading was added to the controlled vendor file.
7. Lessons learned training was conducted for all systems, procurement and chemistry department engineers. Included in the training was the need to adequately identify critical characteristics and perform comprehensive testing of the installed configuration.

CORRECTIVE ACTIONS TO BE TAKEN TO AVOID FURTHER NONCOMPLIANCE

1. Design control, maintenance and procurement procedures are being reviewed and revised as necessary to formalize the determination or review of critical characteristics.
2. Other convertible pole relays used in safety related applications are being identified to determine if any similar restrictions apply.

DATE OF FULL COMPLIANCE

Full compliance has been achieved.