

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-255/92004(DRS)

Docket No. 50-255

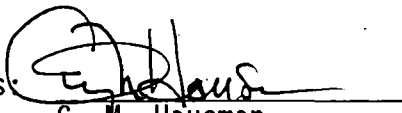
License No. DPR-20

Licensee: Consumers Power Company
1945 West Parnall Road
Jackson, MI 49201

Facility Name: Palisades Nuclear Generating Plant

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: January 13-17, February 12-14, and March 16, 1992

Inspectors: 
G. M. Hausman


5/1/92
Date


W. H. Scott

5-1-92
Date

Also participating in the inspection
and contributing to the report was:

A. C. Udy, EG&G Idaho, Inc.

Approved By: 
F. J. Jablonski, Chief
Maintenance and Outages Section

5-1-92
Date

Inspection Summary

Inspection on January 13-17, February 12-14, and March 16, 1992
(Report No. 50-255/92004(DRS))

Areas Inspected: Special announced safety inspection for assessing the licensee's implementation of post-accident monitoring instrumentation in accordance with Regulatory Guide (RG) 1.97, Revision 3 and actions concerning previously identified 10 CFR 50.49 related environmental qualification (EQ) inspection findings (Modules 2515/087 and 62705; SIMS Number 67.3.3 (Open)).

Results: The licensee has implemented a program to comply with RG 1.97, contingent upon the completion of the activities identified in paragraph 4.3. Two unresolved items were identified concerning qualified isolation devices as discussed in paragraphs 4.1.4.2-4.1.4.4. Two violations were identified in

the EQ followup area concerning inadequate corrective action concerning a previously identified Notice of Violation, as discussed in paragraph 2.2, and eight non-qualified Raychem splices inside containment, as discussed in paragraph 3. The inspectors concluded that the licensee has taken adequate corrective actions to resolve seven previously identified NRC findings.

DETAILS

1. Principal Persons Contacted

Consumers Power Company

- *+P. Donnelly, Plant Safety and Licensing Director
- +R. Corbett, Nuclear Engineering and Construction (NECO) Programs
- *+R. Hamm, Instrumentation and Control (I&C) Section Head
- * R. Kasper, Maintenance Manager
- *+J. Kuemin, Licensing Administrator
- +R. Orosz, NECO Manager
- *+K. Osborne, Systems Engineering Manager
- +V. Petro, Nuclear Plant Assurance Department Site Supervisor
- *+D. Smedley, Staff Licensing Engineer
- *+K. Toner, Electrical, I&C, and Computer Engineering Manager

U. S. Nuclear Regulatory Commission

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

- + Denotes those participating in the site interim exit on January 17, 1992.
- * Denotes those participating in the site interim exit on February 14, 1992.
- Denotes those participating in the telephone exit on March 16, 1992.

Other persons were contacted as a matter of course during the inspection.

2. Licensee's Actions Regarding Previously Identified NRC Findings

2.1 (Closed) Violation (255/86032-1A(DRS)):

This violation was about 55 Rosemount Model 1153 transmitters, used in various safety system control and indication circuits, where the EQ files did not specify, and thus satisfy, appropriate instrument accuracy criteria based on the maximum error assumed in the plant safety analysis. NRC Inspection Report 255/90005(DRS) identified that the licensee had updated the EQ files; however, the item remained open pending review by the Office of Nuclear Reactor Regulation (NRR). During this inspection, the inspectors reviewed all appropriate documentation, including NRR's response dated May 13, 1988, and concluded after discussion with NRC Region III management that this item is closed.

2.2 (Closed) Violation (255/86032-02D(DRS)):

This violation was about inadequacies in the licensee's equipment qualification files concerning maintenance, replacement of equipment, surveillance tests and inspections necessary to preserve the environmental qualification of EQ equipment listed on the Master Equipment List (MEL). This violation was issued using several open items as examples, such as, Open Item

255/86032-02(DRS), which described discrepancies in the Periodic Activity Control Sheet (PACS) listings for Namco and Honeywell position limit switches, and 480/2400 Volt motors. During this inspection, the inspectors reviewed the appropriate documentation concerning this violation and observed that the licensee had taken adequate corrective action to resolve this violation, except for PACS X-OPS309 and X-OPS310. The previously identified violation is closed. However, the licensee failed to revise PACS X-OPS309 (changed to CPS457) and X-OPS310 and associated EQ files to provide steps to analyze oil and inspect sleeve bearings for 2400 Volt motors when the oil appeared discolored.

The inspectors observed that the licensee had not performed the corrective action identified in their response to the notice of violation (NOV) dated December 23, 1988, concerning Open Item 255/86032-02(DRS). As a result, the 2400 Volt motor maintenance activities did not reflect the proper EQ maintenance requirements. The licensee was unaware that the corrective actions had not been performed and, as a result, the inspectors had to prompt the licensee into performing the corrective action for the identified PACS listings. Failure to perform corrective action concerning a previously identified NOV is an example of a violation of NRC requirement 10 CFR 50, Appendix B, Criteria XVI, which requires, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected (50-255/92004-01(DRS)).

2.3 (Closed) Violation (255/89007-01H, -01I and -01J(DRS)):

This violation identified several examples where the licensee failed to provide adequate design control measures for verifying and checking the adequacy of the design.

2.3.1 255/89007-01H and -01I

During upgrading of the HPSI and LPSI flow instrument loops to meet RG 1.97, Category 2 requirements (Facility Change (FC) FC-731), the following discrepancies were identified in the final design calculation 7906-CS-03, Revision 9, dated December 9, 1987.

- The seismic stress analysis assumed an incorrect center of gravity (CG), which was not identified during the licensee's checking process. The analysis criteria required the CG of the instruments/equipment to be considered in the seismic stress calculations. However, the CG of the instruments was not considered in the seismic stress calculations. As a result, the forces and moments at the rack support attachment were inadequately calculated.
- The calculated bending stress "fbx" of the analysis was in error (5645 psi verses 5976 psi). This calculation error was not identified during the checking process.

During this inspection, the inspectors verified the calculation was revised to include the CG, the accurate bending stress "fbx" value and that analytical results represent an acceptable as-built condition. These items are closed.

2.3.2 255/89007-01J

Core cooling instrumentation modification FC-567 added a reactor vessel level monitoring system to the plant design. This FC did not address the impact of the increased load on the inverters, bypass regulators, and battery chargers. FC calculations were performed to analyze the impact of the increased loading on the preferred ac bus supply breakers, cabling to the preferred busses from the respective inverters and on the dc batteries. However, no calculations or analyses were evident which addressed the impact on the inverters, bypass regulator or the dc system battery chargers. Therefore, the inspectors concluded the licensee failed to employ adequate design controls since the full impact of the increased loading was not analyzed during the design stage of the FC. During this inspection, the inspectors verified the licensee performed an engineering analysis documenting that the inverter, bypass regulator, and battery charger were not overloaded as a result of the modification. This item is closed.

2.4 (Closed) Violation (255/90005-03(DRS)):

This violation was about failure to take adequate corrective action to resolve a previously identified violation concerning qualification of potted connectors used on Viking electrical penetrations. Connector insulation resistance measurements were not taken during the accident portion of the EQ test to ensure that instrument accuracy requirements were met. The inspector reviewed the associated work packages and determined, as of February 1, 1991, that all potted connectors used on Viking electrical penetrations had been replaced with environmentally qualified connectors. This item is closed.

2.5 (Closed) Violation (255/90005-04(DRS)):

This violation was about failure to environmentally qualify auxiliary feedwater (AFW) control circuit relays R/0727 and R/0749. The AFW relays, located in a harsh environment, were not included in the EQ Master Equipment List and consequently not environmentally qualified. The inspectors reviewed the "Palisades Plant Equipment Qualification List," and verified the EQ list included the AFW relays. The licensee had also developed "EEQ File Report MISC-35," Revision 0, which provided qualification of the AFW relays to the requirements of 10 CFR 50.49(k). This item is closed.

3. Non-Qualified Cable Splices Inside Containment

Licensee Event Report (LER) 91-002 dated January 28, 1991, stated Consumers Power Company had non-qualified Raychem heat shrink tubing installed on reactor head vent valve cabling, shutdown cooling valve cabling, and hydrogen recombiner cabling inside containment. Review of the LER 91-002 and associated documentation by the inspectors identified the following NRC concerns:

- Eight Raychem cable splices were not qualified prior to the EQ deadline of November 30, 1985.
- The licensee reported this event. However, the LER was issued

75 days after the event was identified as reportable.

- o The licensee failed to perform an adequate engineering review during a previously identified deviation report (D-QP-88-003), which reworked splices on some of the same equipment outside containment, but failed to follow through and extend the review to the containment penetrations. If an adequate engineering review would have been performed at that time, this occurrence may have been prevented.
- o The licensee failed to report the discovery of non-qualified Raychem cable splices identified in the 1988 deviation report via an LER.

Based upon the above concerns, this is an example of a violation of NRC requirement 10 CFR 50.49 paragraphs (f) and (g), which requires electrical equipment important to safety must be qualified by test and analysis prior to the EQ deadline of November 30, 1985 (50-255/92004-02(DRS)).

4. (Open) Temporary Instruction (TI 2515/087) (SIMS No. 67.3.3)

The inspectors compared the installed RG 1.97 instrumentation to the commitments made in licensee correspondence related to post-accident instrumentation as described in the Palisades RG 1.97 Safety Evaluation Report (SER). References used in the assessment were:

RG 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3, dated May 1983.

Letter, CPCo to NRC dated April 14, 1983.

Letter, CPCo to NRC dated September 13, 1983.

Letter, CPCo to NRC dated April 30, 1986.

SER, NRC to Consumers Power Company (CPCo), dated October 20, 1987, with Technical Evaluation Report EGG-EA-6926, "Conformance to Regulatory Guide 1.97: Palisades Plant," dated July 1986 prepared for the NRC by EG&G Idaho, Inc.

Letter, CPCo to NRC dated January 22, 1988.

4.1 Technical Evaluation of RG 1.97 Instrumentation

The inspectors examined the following RG 1.97 variables:

Auxiliary Feedwater Flow, Category 2, Type D
Component Cooling Water (CCW) Flow to Engineered Safety Features System, Category 2, Type D
Containment Hydrogen Concentration, Category 1, Type A
Degrees of Subcooling, Category 1, Type A

High Pressure Coolant Injection Flow, Category 2, Type D
Low Pressure Coolant Injection Flow, Category 2, Type D
Pressurizer Level, Category 1, Type A
Quench Tank Pressure, Category 3, Type D
Quench Tank Temperature, Category 3, Type D
Reactor Coolant System Cold Leg Water Temperature, Category 1, Type B
Reactor Coolant System Hot Leg Water Temperature, Category 1, Type B
Reactor Coolant System Pressure, Category 1, Type A
Residual Heat Removal System Heat Exchanger Outlet Temperature,
Category 2, Type D
Status of Standby Power, Category 2, Type D
Steam Generator Level, Category 1, Type A
Steam Generator Pressure, Category 1, Type A

The inspectors reviewed the status of SER exceptions, environmental equipment qualification, redundancy, physical and electrical separation, power sources, instrument range, equipment identification, equipment calibration, and system interfaces for the above variables' instrumentation. The inspectors interviewed plant personnel and inspected the RG 1.97 instrumentation in the control room to assess the implementation of the requirements delineated in RG 1.97. The following concerns were identified.

4.1.1 Calibration of Instrumentation

The inspectors observed that of the 16 RG 1.97 variables examined, 10 instruments representing 2 RG 1.97 variables were not included in the licensee's calibration program. The calibration program did not include the status of standby power and CCW pumps voltage, current, frequency, and watt meters. As identified in paragraph 4.3, the licensee stated that these instruments would be calibrated and incorporated into a periodic calibration program by May 1, 1992. In addition, the licensee also stated that the list of RG 1.97 instruments would be reviewed to assure all equipment is included in a periodic calibration program by May 31, 1992.

4.1.2 Isolation of Pressurizer Level Channel A (Class 1E) from the CFMS

The inspectors observed that the subject instrumentation channel was connected to the Critical Function Monitoring System's (CFMSs) non-Class 1E input termination cabinet without adequate isolation. The licensee determined that the signal cable should have been routed to the CFMSs Class 1E input termination cabinet to provide electrical isolation between the Class 1E and non-Class 1E circuits. During the 1992 refueling outage, the licensee rerouted the subject signal cable to the CFMSs Class 1E input termination cabinet. The inspectors had no further concerns.

4.1.3 Unique Identification of RG 1.97 Control Room (CR) Instrumentation

The licensee did not have a unique identification method for all RG 1.97 Category 1 and 2, Type A, B, and C instrumentation. CR instruments, whether or not a RG 1.97 instrument, whose associated sensor was located in a harsh environment were identified with a light blue label. CR instruments, whether or not a RG 1.97 instrument, whose associated sensor was located in a mild

environment were primarily identified with a tan label]. The operator could not easily discern which instruments were intended for use under accident conditions. The licensee stated, that a common designation for RG 1.97 CR instrumentation would be developed, the CR instruments relabeled to provide the unique identification, and the operators would be trained in the labeling method by June 30, 1992.

4.1.4 Indeterminate Isolation

RG 1.97 states that Category 1 instrumentation should be electrically independent and physically separated from each other and from equipment not classified as important to safety. The inspectors could not verify the use of qualified isolation devices for Category 1 instrumentation in the following applications:

4.1.4.1 Steam Generator Pressure Channel A to Non-Class 1E Datalogger

The licensee initially designated four steam generator pressure instrumentation channels per steam generator to be used to monitor this variable for the RG 1.97 program. The inspectors observed that the isolation interface between the channel A instrumentation and the input to the non-Class 1E Tennecomp datalogger did not meet the guidance of RG 1.97 for qualified isolation. To resolve this issue, the licensee decided to designate only two of the four pressure channels on each steam generator as RG 1.97 instrumentation. These two channels (B and C) meet the RG 1.97 requirements for post-accident monitoring instrumentation. The licensee stated that the channel A steam generator pressure instruments will not be designated as RG 1.97 instrumentation. Based upon the above and discussions with SICB at NRR, the inspectors had no further concerns.

4.1.4.2 Steam Generator Pressure Channel B to Non-Class 1E Data Processor

This instrumentation channel used 100k Ohm resistors for the isolation interface. This method of isolation has not been approved by the NRC as an acceptable form of isolation. The licensee provided documentation (letter dated August 10, 1983), which identified the analytical analysis used to support the use of resistors as isolation devices. However, as a result of discussions held with SICB at NRR, the analytical analysis alone is not sufficient to determine that the use of resistors as isolators will provide adequate protection during a maximum credible fault. Therefore, if the resistor circuit configuration is to be used by the licensee as a method of isolation, empirical test data must be provided that assures the application of a maximum credible fault will not degrade the operation of the protected circuit. The licensee stated that the resistor isolation configuration will be tested and that the results of the testing will be provided to the NRC by December 31, 1992. This is considered an unresolved item pending NRC review of the test data (50-255/92004-03(DRS)).

4.1.4.3 Pressurizer Pressure Channel A to Non-Class 1E Datalogger/ Data Processor

The inspectors observed that no isolation existed between the subject channel A instrumentation and the input to the non-Class 1E feedwater purity datalogger, and non-Class 1E primary instrumentation data processor. To resolve this concern, the licensee (during the 1992 refueling outage) installed resistor isolation. However, as identified in paragraph 4.1.4.2, this is considered an unresolved item (50-255/92004-03(DRS)) pending NRC review of the test data.

4.1.4.4 Containment Hydrogen Monitor to Non-Class 1E Recorder

The inspectors observed that this variable did not use a qualified isolation interface. The licensee stated that test data for the Model CD-4000 isolator would be provided to establish the acceptability of this device with regard to maximum credible faults or replace the module with a qualified isolator. The licensee stated, that the test data would be submitted to the NRC by December 31, 1992, or the isolator would be replaced during the 1993 Refueling Outage. This is considered an unresolved item pending NRC review of the test data or notification from the licensee that a qualified isolation device has replaced the non-qualified isolation interface (50-255/92004-04(DRS)).

Based upon the number of isolation problems identified during the inspection, the licensee stated that a review of all RG 1.97 Category 1 instrumentation would be completed by June 30, 1992, to verify that adequate electrical isolation has been provided. In addition, the licensee stated that all internal reviews had not been completed of the Palisades design basis with respect to RG 1.97. As a result, the licensee stated that a letter would be issued to the NRC by May 1, 1992, which identifies the planned corrective actions with completion dates to resolve the concerns, and any additional items which maybe identified.

4.2 Status of SER Exceptions

4.2.1 Accumulator Tank Level and Pressure

As stated in the SER, the NRC is reviewing whether Category 2 instrumentation is necessary for this variable. Resolution of this issue is pending NRC/NRR review, with no licensee action required at this time.

4.2.2 Component Cooling Water (CCW) Flow to ESF System

The SER stated that the licensee's instrumentation identified (pump motor current and valve position) for this variable was unacceptable. During this inspection, the licensee identified the following instrumentation to monitor CCW flow.

- CCW pump motor current
- CCW pump discharge pressure
- CCW surge tank level

- Shutdown cooling (SDC) heat exchanger outlet temperature (CCW side)
- SDC heat exchanger inlet temperature (CCW side)

The inspectors discussed the use of the above instruments to monitor CCW flow with SICB at NRR and the reviewing agency. Based upon those discussions, it was determined that use of this instrumentation meets the requirement of RG 1.97 to monitor CCW flow. The inspectors had no further concerns.

4.2.3 Quench Tank Pressure

The licensee's instrumentation was identified in the SER as needing to have the range increased to include the design pressure of the quench tank. The range at that time was identified as zero to 25 psig. The inspectors found a dual range indicator with ranges of zero to 25 psig and zero to 100 psig. The second range includes the limiting tank design pressure and is in conformance with RG 1.97. The inspectors had no further concerns.

4.2.4 Quench Tank Temperature

The licensee's instrumentation was identified in the SER as needing to have the range increased. The range at that time was identified as zero to 300°F. The inspectors found that the range was zero to 350°F. This range includes the maximum expected saturation temperature of the quench tank contents. The inspectors had no further concerns.

4.2.5 Steam Generator Pressure

RG 1.97 recommended instrumentation capable of monitoring this variable with a range of zero to 20% above the lowest safety valve setting. The licensee had provided instrumentation with a range of zero to 1000 psig. The lowest safety valve setting was 985 psig (\approx 1000 psia). The SER required the range to be changed to meet the requirements of the RG 1.97. During the control room inspection, the inspectors found the range of the instrumentation was zero to 1200 psia. This meets the requirements of RG 1.97, therefore, the inspectors had no further concerns.

4.3 Licensee Activities

As a result of discussions held with the licensee, a preliminary list of tasks for resolving the concerns identified in paragraphs 4.1.1-4.1.4 was provided to the inspectors. This is the preliminary list of planned RG 1.97 activities remaining to be completed:

May 1, 1992

Complete calibration and incorporate instrumentation used to monitor the status of standby power and component cooling water flow into a periodic calibration program.

May 31, 1992

Complete review of RG 1.97 parameters to assure all equipment is included in a periodic calibration program.

June 30, 1992

Complete review of all RG 1.97 Category 1 instrumentation to verify adequate electrical isolation has been provided.

Complete development of the methodology for uniquely identifying RG 1.97, Category 1 and 2, Type A, B and C variables on the main control panels.

Complete relabeling of the RG 1.97 CR instruments to provide unique identification.

Complete operator training concerning the RG 1.97 labeling method.

December 31, 1992

Complete testing of the 100k Ohm resistor isolation configuration and provide the test data results to the NRC.

Submit test data to the NRC for the Containment Hydrogen Monitoring System's Model CD-4000 isolator to establish the acceptability of this device with regard to maximum credible faults (if the module can be successfully qualified); Otherwise, the licensee will replace the CD-4000 isolator with a qualified isolator during the 1993 Refueling Outage.

The licensee stated that a finalized schedule would be submitted to the NRC by May 1, 1992, identifying planned corrective actions with completion dates to resolve the RG 1.97 concerns. In addition, this schedule would also identify any additional items that are currently known as not being completed that are required for the Palisades RG 1.97 program.

Based on the above, the inspectors discussed the inspection results with the Instrumentation and Controls Systems Branch (SICB) at NRR and concluded that the licensee had implemented a program to meet the requirements of RG 1.97, Revision 3, contingent upon the completion of the activities identified in paragraph 4.3. The completion of these activities will be followed as Open Item 50-255/92004-05(DRS).

5. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. Unresolved items remaining open during this inspection are discussed in paragraphs 4.1.4.2, 4.1.4.3, and 4.1.4.4.

6. Exit Interview

The Region III inspectors met with the licensee's representatives (denoted in paragraph 1) during the inspection period and on January 17, February 14, and by telephone at the conclusion of the inspection on March 16, 1992, to discuss the inspection findings. The inspectors discussed the likely content of the inspection report with regard to documents or processes reviewed by the inspectors. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.