U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No.: 50-255/92011(DRS)

Docket No.: 50-255 License No.: DPR-20

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

Facility Name: Palisades Nuclear Plant

Inspection At: Palisades Site, Covert, Michigan

Inspection Conducted: February 12-14, 25-27, March 24-27, and April 16, 1992

Inspectors: F. J. Jablonski for G. Hausman — Date: 4-27-92

D. Schrum — Date: 4/27/92

Approved By: F. J. Jablonski, Chief, Maintenance and Outages Section — Date: 4-27-92

Inspection Summary

Inspection on February 12-14, 25-27, March 24-27, and April 16, 1992 (Report No. 50-255/92011(DRS))

Areas Inspected: Special inspection of matters associated with the main steam isolation valve actuator solenoid valves being inoperable in the event of a high energy line break due to an inadequate design. Portions of NRC Inspection Procedure 62705 were used during the inspection.
Results: In December 1990, the licensee's contractor issued a report of an extensive environmental qualification review that identified a large number of discrepancies. The licensee failed to start a thorough review of the report until December 1991. As a result of the review, the licensee identified on February 5, 1992, that the main steam isolation valves were inoperable due to an unqualified electrical circuit. Since the reactor was at 100% power, the licensee requested and received a temporary waiver of compliance. However, the licensee's request for the waiver did not fully disclose how the unqualified circuits were identified, the existence of a contractor's report, or the other deficiencies identified within the report. Subsequently, a number of other

equipment environmental qualification problems were identified by the licensee, which were reported to the NRC as licensee event reports.

Two apparent violations were identified. Section 3.4.2 describes problems with supplying the NRC with complete and accurate information, and Section 3.4.3 describes problems with inadequate corrective action.

DETAILS

1.0 Principal Persons Contacted

Consumers Power Company (CPCo)

G. Slade, Plant General Manager
#*D. Day, Environmental Qualification Engineer
#*P. Donnelly, Plant Safety and Licensing Director
#*R. Hamm, Instrumentation and Control Section Head
#*J. Kuemin, Licensing Manager
#*R. McCaleb, Nuclear Program Audit Department Specialist
#*K. Osborne, System Engineering Manager
#*K. Toner, Electric/I&C/Computer Engineering Manager
D. VandeWalle, Mech & Civil/Structural Engineering Manager
R. Orosz, Nuclear Engineering Manager

U. S. Nuclear Regulatory Commission (NRC)

M. Ring, Engineering Branch Chief, Division of Reactor Safety
M. Gamberoni, Licensing Project Manager, by Telephone
#*J. Heller, Senior Resident Inspector
B. Jorgensen, Chief, Reactor Projects Section 2A
*R. Roton, Resident Inspector

The NRC inspectors also contacted and interviewed other licensee personnel during the inspection.

*Denotes those present at the exit meeting held March 27, 1992.
#Denotes those present at the exit meeting held April 16, 1992.

2.0 Licensee Action on Previous Inspection Findings

2.1 (Closed) Open Item (255/87027-02) Weakness with tracking the status of NRC issues.

The licensee improved the ability to update the data base for open items so that ongoing knowledge of what actions have been completed is available. The licensee's correspondence to the NRC on January 28, 1988, was correct in stating that a Region III special task force had reviewed this system and concluded in a May 16, 1986, report that for the intended purpose of tracking commitments that the Correspondence Logging & Commitment Tracking System (CLCTS) works adequately. The special task force had performed a spot check of 100 open items, unresolved items, and violations from the CLCTS and compared them with records, specifically to determine whether those classified as externally closed were in agreement with those listed as closed in the Region III records. With only one exception all the remaining items checked were accurately recorded.

No additional problems have been noted by the regional or resident staff subsequent to the occurrence of the above

concerns. The inspector agrees with the licensee's assessment that this was an isolated incident. This item is closed.

2.2 (Closed) Unresolved Item (255/87027-03) Effectiveness of the Configuration Control Project (CCP).

The inspectors determined that Schematic Diagram E-5, Sheet 15, Revision 5 had not been revised to incorporate modification FC-687. The NRC stated that the effectiveness of the CCP could be adversely affected if management attention was not given to future modifications.

The licensee stated that this type of problem is discovered and corrected during the review process by the CCP electrical drawing verification and correction task group. The inspector determined that the CCP has been effective in finding and correcting these types of problems. The licensee invested substantial time in the review of each modification with each drawing being redlined during its comparison to the as-built configuration in the plant. The discrepancies were appropriately prioritized for importance to ensure timely corrective actions for the items important to safety. No additional NRC concerns exist for this problem. This item is closed.

2.3 (Closed) Unresolved Item (255/88020-6A) Licensee failed to take proper corrective actions when discrepancies were identified by the CCP team.

The licensee failed to correct and resolve discrepancies with approximately 300 electrical drawings during electrical plant walkdown inspections. The licensee's corrective action was to bring the CCP discrepancy categorization and evaluation process into agreement with the actual drawing walkdown. The inspector determined that the corrective actions were adequate to prevent the condition as described in the unresolved item. The licensee had made substantial progress with the CCP efforts since this unresolved item was issued and it appeared that the majority of the work will be completed by the end of 1992. This item is closed.

3.0 Inspection Results

3.1 Purpose of the Inspection

The purpose of the inspection was to review the matters associated with the main steam isolation valve (MSIV) solenoid actuator valves being inoperable in the event of a high energy line break, which led to a plant shut down on February 6, 1992.

3.2. Description of Event

On February 5, 1992, the licensee determined that the solenoid valves that actuate the MSIVs could cause a short circuit during a postulated high energy line break and prevent the MSIVs from closing on demand. On February 6, 1992, the licensee promptly reported the problem to the NRC and requested a Temporary Waiver of Compliance (TWOC). On the same day, after determining that the problem could not be repaired, the licensee appropriately declared the MSIVs inoperable per Technical Specification 3.5.1f and shut down the plant.

As described in licensee event report (LER) 92-07, "Main Steam Isolation Valves Inoperable Due to an Unqualified Electrical Circuit," and as determined by the NRC this condition was caused by:

* a design deficiency involving the installation of non-environmentally qualified solenoid valves;

* lack of adequate isolation between Class 1E and non-Class 1E circuitry; and

* lack of adequate isolation between redundant Class 1E components located in different areas.

3.3 Significance of Event

Although a main steam line break in the area of concern is not likely, the failure of the MSIVs to close during a steam line break outside containment (the event which could disable the MSIV solenoid valves) is considered significant. The MSIVs would not fail safe, that is, electric power would be needed to actuate solenoids to cause the mechanical operator to move and close the MSIVs. Failure of the MSIVs would create the potential for a double steam generator blow down, possible tube rupture, and possible off-site release of radiation greater than 10 CFR 100 limits.

3.4 Inspection Findings

3.4.1 Immediate Actions and Corrective Actions

On February 6, 1992, the licensee promptly reported the problem with the MSIV actuator solenoids to the NRC and asked for a TWOC to evaluate the problem and implement corrective action. After determining that the problem could not be repaired within the available time, the licensee shut down the plant two weeks prior to a scheduled refueling outage. The MSIV solenoid problem was reported in LER 92-07 within the 30-day limit.

On February 25, 1992, the licensee completed a detailed review of the contractor's report, which had contributed to the finding of the MSIV solenoid problem. This report included approximately

2500 items, which resulted in about 800 discrepancies with the majority being documentation problems. The inspectors reviewed about 10% of the licensee's review of the contractor's findings. All of those items had been appropriately reviewed for significance. Seven Deviation Reports (DR) were written for the most significant problems. The inspectors reviewed the DRs for start up concerns and determined that the resolutions were adequate. The licensee made modifications or appropriately justified why operations could resume. The licensee's corrective actions for the several hundred documentation problems are projected to be completed by the end of 1992; however, initiation of corrective actions had just recently been started.

The modification to the MSIV solenoids, which was completed during the recent refueling outage, did eliminate the specific component environmental qualification (EQ) problems with the solenoids. The MSIV solenoids were moved from the component cooling water (CCW) room to an electrical switchgear room, which is in a mild environment. The inspector reviewed the MSIV modification package and determined that it was comprehensive and thorough. A detailed evaluation was made that met the requirements of 10 CFR 50.59. The inspectors were initially concerned that one set of solenoid valves was located in a non-vital area; however, following additional reviews by the NRC, the location was determined to be acceptable.

The licensee's efforts to improve the EQ program were apparent in that EQ and modification procedures had improved during the past few years. The inspectors determined that the procedures contained information that will contribute to the licensee's compliance with EQ requirements. However, during the review of the licensee's corrective actions the inspectors determined that the station EQ Technical Group was understaffed to accomplish the necessary improvements to the electrical environmental qualification (EEQ) list and program in a timely manner. There was a high turnover of EQ staff for the past 7 years and very few of the staff held the job for more than 1 year. The experience level of the staff was very low. The inspectors reviewed the EQ staff training records and concluded that EQ training had not been comprehensive. However, the licensee had recently initiated improvements to the EQ training. The EEQ list and program were being reviewed and improved by a person trained and dedicated to that task.

On March 11, 1992, members of the licensee's staff came to Region III for a management meeting to discuss operability issues for the projected April 15, 1992, restart. The licensee stated during the meeting that there were plans for an extensive effort similar to the CCP program to find any remaining EQ problems in the plant. The licensee also stated that future EQ efforts would be documented in a letter to NRC on April 30, 1992. Following

additional NRC review of the significant issues, there were no additional concerns for plant restart.

3.4.2 Temporary Waiver of Compliance

As noted in Section 3.4.1, on February 6, 1992, the licensee requested that the NRC grant a 72 hour TWOC to operate the plant and resolve the problem with the MSIV operator solenoids. The TWOC was granted based on the information provided by the licensee and the low probability of risk to the plant. However, the licensee determined that the problem could not be fixed during the TWOC time period, so the reactor was shut down 2 weeks prior to a scheduled 60 day refueling outage.

When the licensee orally requested the TWOC they failed to provide information to the NRC about the contractor's report, which is discussed in Section 3.4.3. The report contained other EQ problems that were potentially significant. The NRC's decision to grant the TWOC may not have occurred had the NRC known about the additional EQ discrepancies. In addition, neither the subsequently written TWOC, nor LER 92-07, mention the matters discussed in the contractor's report. Failure to provide complete and accurate information to the NRC is an apparent violation of 10 CFR 50.9. (255/92011-01(DRS))

3.4.3 Licensee's Response to a Contractor's Review of EQ Problems

As a result of EEQ problems the licensee initiated a contractor review of EQ problems. In December 1990, the contractor issued a report to the licensee. The report indicated that there were approximately 2500 problems with 63 listed as potentially significant. Through interviews with licensee personnel, the inspectors determined that upon receipt of the report, the licensee performed a cursory review of the report but found no apparent significant problems, so no actions were taken. On March 14, 1991, the plant was returned to service following a six month outage without the licensee having fully evaluated the problems in the report. The licensee's reviewer had an item on his "things to do list" to review and correct the problems found by the contractor, which he considered to be documentation discrepancies. The report remained with the reviewer even after a plant staff reorganization in May 1991.

In December 1991, the report was turned over to the site EQ improvement person for review after the CCP identified a discrepancy that also appeared in the contractor's report. This occurred 12 months after the contractor's report was issued. On February 5, 1992, during the review of the contractor's report, the licensee identified the MSIV control circuitry problem. A short in the MSIV solenoid or circuitry due to a steam line break in the CCW room could render the turbine building solenoids

inoperable because both sets of solenoids share a common power supply. This problem was found as a result of reviewing schematic diagram E-238 SH.1, for the MSIVs. The problem was also noted in the contractor's report as a discrepancy with an unqualified hand switch in the MSIV operator solenoid circuit.

On February 25, 1992, the licensee completed a detailed review of the contractor's EQ report. As a result, DRs were written on the following equipment: residual heat exchanger temperature elements, pressurizer level instrumentation, main steam line radiation monitors, component cooling water heat exchanger solenoid valves and position switches, and feed water system motor operated valves. These problems were reported to the NRC in LERs.

As indicated in this Section, and in Sections 3.4.1 and 3.4.5, it appears that the licensee did not perform adequate corrective actions to disposition EQ problems in a timely manner even though the contractor's report contained evidence of EQ discrepancies and was available to the licensee for over 1 year. This is an apparent violation of 10 CFR 50 Appendix B, Criterion XVI, Corrective Actions. (255/92011-02(DRS))

3.4.4 Background Facts on the MSIV Actuator Solenoids

In 1973, the Atomic Energy Commission (AEC) identified a concern with high energy line breaks (HELB) outside containment. The MSIV solenoid valves, located inside the CCW room, were not qualified for the postulated environmental conditions of a break of the main steam line which passes through this room. The licensee's response in "Special Report No. 6," dated 1973, committed to install a redundant set of solenoid valves outside the CCW room to isolate and vent air from MSIV operators. In 1974, a spare set of MSIV operator solenoid valves was installed in the turbine building for the high energy line break condition.

In 1979, the licensee developed the initial EEQ list in response to NRC Bulletin 79-01. At that time the MSIV operator solenoid valves were on the EEQ list. Two years later, they were removed from the EEQ list because the redundant solenoid valves were considered to be in a non-harsh environment. In 1984, during reviews to meet the requirements of the EQ Rule, 10 CFR 50.49, the licensee took credit for the MSIV operator solenoid valves in the turbine building; therefore, EQ requirements were not considered necessary. However, the licensee failed to evaluate the electrical design, which did not meet the single failure requirements. A HELB in the turbine building could cause the solenoid valves to short circuit, blow a fuse, and disable both sets of solenoid valves, which received voltage from the same source.

3.4.5 History of Equipment Environmental Qualification (EQ) Problems

Numerous EQ problems have occurred at Palisades since November 30, 1985, when licensees were required to meet EQ requirements and be in full compliance to 10 CFR 50.49. In December 1986, the NRC identified eight significant EQ deficiencies at Palisades. Two violations and a civil penalty were issued to the licensee regarding EQ problems with 55 transmitters, 38 solenoids, and 15 motor-operated valve actuators. A violation was issued after an inspection in March 1990 when an EQ problem was found with two relays installed in the auxiliary feedwater control circuitry, and action was not taken to adequately resolve a violation identified in 1986. In 1992, EQ problems were identified with eight electrical splices and a violation was issued because the licensee failed to take adequate corrective action to resolve a previously identified EQ problem. In January 1989, the NRC issued Information Notice 88-86, Supplement 1, which specifically described the adverse conditions with solenoid valves that could be caused by high energy line breaks. The licensee reviewed the situation but did not include the MSIV operator solenoid valves because they were not on the EEQ list. The NRC issued numerous other Information Notices, Bulletins, and inspection reports on EQ.

The inspectors reviewed the licensee's self-assessment activities for the EQ area. The inspectors found that even though the plant had problems in the EQ area since 1985, the licensee had only performed one EQ quality assurance (QA) audit since that time. The audit was performed in March 1991. This audit had been previously evaluated in NRC Inspection Report 50-255/92003, as a QA audit with a very limited scope. Based on all of the previous problems in the EQ area it appeared to the inspectors that the audit should have been much broader in scope.

4.0 Exit Meeting

The inspectors met with the licensee at the site on March 27, 1992, for an interim exit and on April 16, 1992, for a final exit to summarize the purpose, scope, and findings of the inspection. A verbal summary of the inspection findings was provided to the licensee at that time. The inspectors 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 or processes as proprietary.