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REGION III

Docket No. 50-255

License No. DPR-20

Report No. 50-255/97013(DRP)

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility: Palisades Nuclear Generating Plant

Location: 27780 Blue Star Memorial Highway
Covert, MI 49043-9530

Dates: October 18 through December 5, 1997

Inspector: P. Prescott, Resident Inspector
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Approved by: Bruce L. Burgess, Chief
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EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant NRC Inspection Report No. 50-255/97013

This inspection reviewed aspects of licensee operations, maintenance, engineering, and plant support. The report covers a seven-week period of resident inspection.

Operations

- The inspectors identified a violation in that procedure SOP-1, "Primary Coolant System," Revision 38, was inappropriate for the circumstances. This procedure allowed the operators to start a primary coolant pump without verifying that the Technical Specification requirements for starting forced circulation were met. The inspectors were concerned about the similarity of this event to an event identified in Inspection Report No. 50-255/97008 (Section 01.2).
- The licensee was required to enter a second forced outage to repair relief valve RV-2013 bellows. An operator workaround for chemical volume and control system (CVCS) pressure control, in conjunction with material condition problems on the turbine stop valve bypass valves and an unusual CVCS system configuration, resulted in an RV-2013 bellows failure. The inspectors concluded that adequate corrective actions had been planned or taken to prevent recurrence of this problem (Section 01.2).

Maintenance

- The inspectors noted that most maintenance was conducted in a professional and thorough manner. All work observed was done with the work package present and in active use. Work packages were comprehensive for the task and post maintenance testing requirements were adequate. The inspectors frequently observed supervisors and system engineers monitoring work. When applicable, work was done with the appropriate radiation control measures in place (Section M1.1).
- The licensee's preparation for and conduct of the work for the main steam bypass valve repair was good. However, the inspectors noted a weakness in management oversight of the job. Once all preparatory work was done, no single individual had overall responsibility for scheduling and completing the repair (Section M1.2).

Engineering

- The inspectors determined that the licensee's actions were adequate to address the atmospheric dump valve hot short Appendix R scenario and rebaselining of fire dampers and barriers. The inspectors also concluded that the Appendix R review team was adequately staffed and supported. However, the inspectors were concerned with plans to potentially reduce the Appendix R evaluation effort should resources be needed to support the upcoming 1998 refueling outage. The inspectors also stressed the importance of a timely response to the longstanding Appendix R issues (Section E1.1).

- The engineering department's operability evaluation and assistance for preparations for the repairs to main steam isolation valve (MSIV) MO-0510 were thorough. The engineering department's efforts had improved over those associated with previous similar MSIV repairs (Section E1.2).

Plant Support

- During an emergency preparedness drill, the licensee identified a deficiency involving a prolonged period of time before a search and rescue team was sent to find a simulated injured individual. The licensee stated that a review will be performed to correct the response timeliness concerns (Section P1.1).

Report Details

Summary of Plant Status

The plant began the inspection period at 80 percent power due to a forced maintenance outage to repack the "B" reheater drain pump. Repairs were completed and power escalation was resumed on October 21, 1997. The unit was at full power October 22, 1997. The plant remained at full power for the remainder of the inspection period.

I. Operations

01 Conduct of Operations

01.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. Several weaknesses were noted when operations took all control rods out of service to perform maintenance while at power. This event was detailed in special Inspection Report No. 50-255/97014. Other specific events and noteworthy observations are detailed below.

01.2 Starting Forced Circulation with Steam Generator Secondary Temperature Above Cold Leg Temperature

a. Inspection Scope (71707)

The inspectors reviewed the circumstances and events surrounding starting primary coolant pump (PCP) P-50D while steam generator secondary temperature was above cold leg temperature.

b. Observations and Findings

On October 12, 1997, a plant heat up from a short maintenance outage was in progress, shutdown cooling was in operation, and the operations shift was preparing to start PCP P-50D. Because the outage was expected to last less than 16 hours, the steam generators were not placed on recirculation nor was nitrogen bubbled through the steam generators. Per Procedure SOP-1, "Primary Coolant System," Revision 38, the parameters for starting PCP P-50D were verified, and PCP P-50D was started, causing a brief pressure rise. Shutdown cooling return temperature was 130° F, cold leg temperature (T_{cold}) for PCP P-50D was 127° F, and the steam generator hand-hole pyrometer temperatures were 125.2° F for the "A" steam generator and 129.6° F for the "B" steam generator.

Precautionary measures were in place in the event that primary coolant system pressure changed significantly after starting PCP P-50D. Consequently, the operators limited the pressure rise, and no low temperature overpressure protection actuation occurred. The pressure transient was within the design capabilities of the primary coolant system (PCS) and the shutdown cooling system; therefore, the actual safety significance of this event was minor. The basis for Technical Specification (TS) 3.1.1 stated, in part, "The

requirement that the steam generator temperature be \leq than the PCS temperature when forced circulation is initiated in the PCS ensures that an energy addition caused by the heat transferred from the secondary system to the PCS will not occur." From the amount of primary coolant system pressure rise following the start of the PCP, it was apparent that the bulk steam generator secondary temperature could not have been less than T_{cold} ; therefore, when the operators started PCP P-50D, a violation of TS 3.1.1.h occurred.

Procedure SOP-1, Revision 38, required, in part, that the operators, "Compare temperature readings obtained in Step 4.3.1.b.1 [steam generator hand-hole pyrometer temperatures] to Shutdown Cooling return temperatures (when Shutdown Cooling is operating) or loop T_{cold} instruments (when Shutdown Cooling is secured) and refer to TS 3.1.1.h." This step contradicted TS 3.1.1.h.(2) which required comparing steam generator secondary temperature to T_{cold} when starting the first PCP. Also, procedure SOP-1 did not take into consideration that the steam generator inventory may not be mixed if the steam generators were not placed on recirculation or nitrogen bubbling. The steam generators were stratified with the colder water in the lower part of the steam generators, where the hand-hole is located.

The inspectors concluded that one root cause of the TS violation was that procedure SOP-1 was inadequate for the circumstances in that it failed to ensure that TS 3.1.1.h requirements were met. This procedure also failed to ensure that a representative steam generator secondary temperature was obtained for comparison to T_{cold} . This was a violation of 10 CFR Part 50, Appendix B, Criterion V, "Instruction, Procedures, and Drawings," (50-25/97013-01(DRP)).

The inspectors were also concerned about the TS aspects of this event and the lack of a questioning attitude by the operators involved. Recently, a similar violation (50-255/97008-01(DRP)) was issued for a procedure which did not adequately prevent operation of the reactor above the licensed thermal power limits. In the earlier case, the TSs were not violated; however, in this event, the operators started PCP P-50D and violated the TS even though procedure SOP-1 required the operators to refer to the appropriate TS.

Operations management participated in a critique of this event with the licensed operators involved. The emphasis was on compliance with TSs and making conservative decisions with respect to TS limits. Other corrective actions have been proposed to improve procedural adherence and training aspects related to this event.

c. Conclusions

The inspectors identified that procedure SOP-1, "Primary Coolant System," Revision 38, was inappropriate for the circumstances. This procedure allowed the operators to start a primary coolant pump without verifying that the TS requirements for starting forced circulation were met. The inspectors were concerned about the similarity of this event to an event identified in Inspection Report No. 50-255/97008.

01.3 Chemical Volume and Control System (CVCS) Relief Valve Operation

a. Inspection Scope (71707)

The inspectors reviewed the circumstances that led to the operation of the CVCS relief valve (RV)-2013 and discussed this event with operations personnel. The subsequent licensee actions to repair the relief valve and continue the ongoing plant startup were also observed.

b. Observations and Findings

The operators were in the process of a plant heatup on October 9, 1997. The main steam isolation valves (MSIV's) were open to supply steam to the air ejectors and turbine gland sealing system. The turbine electro-hydraulic system was placed in operation and then the turbine was tripped. Following the turbine trip, the operators noticed that the primary coolant system (PCS) was cooling down. The operators called the turbine system engineer to assist in troubleshooting. The system engineer determined that the No. 1 turbine stop valve bypass valve and the associated governor valve had stuck partially open, allowing a steam flow path to the condenser, causing the PCS cooldown. The No.1 turbine stop valve bypass valve was closed by manual operation to stop the cooldown.

The next operating shift started a second charging pump and increased letdown for chemistry control, causing the differential pressure across the in service CVCS demineralizer to increase; however, no attempt was made to reduce the higher than normal differential pressure across the demineralizer. The operations shift expected that the CVCS would be in that condition for only a short time and did not want to pick up radiation dose adjusting the downstream demineralizer flow control valve (CV)-2033.

The oncoming operations shift was not made aware during shift turnover that the demineralizer differential pressure was high. This shift found the No. 1 turbine stop valve bypass valve sticking open again. The valve was stroked twice to try and reseal it, but it stuck further open, and the PCS began to cool down again. Operators closed the MSIVs and throttled the MSIV bypasses which increased PCS temperature, causing pressurizer level to increase and the third letdown orifice stop valve to open. This caused RV-2013 to open because the demineralizer differential pressure was already high. The relief valve bellows subsequently failed, resulting in a primary coolant leak. The licensee had to enter a second forced outage in order to repair the relief valve bellows.

The inspectors noted several causal factors for this event:

- A modification to the CVCS to remove the boron meter did not address known system pressure control problems. This had resulted in operators having to manually control CV-2033 when charging and letdown conditions changed.
- The leaking turbine valves resulted in an unexpected PCS cooldown.
- The off-going operations shift failed to discuss the current status of the CVCS with the oncoming shift.

The licensee's review of this event was made part of a level two condition report initiated to address other recent operations problems. Specifically, the following corrective actions were planned or taken :

- The CVCS system would be tested to determine the best method for controlling CVCS demineralizer differential pressure.
- The turbine stop valve bypass valves would be repaired during the next scheduled outage.
- The sequence of pre-startup testing would be changed to move the turbine electro-hydraulic system test to a period when PCS cooldown would not be a problem.
- This event would be discussed with all operating shifts, emphasizing the need to be aware of plant and system status.

This event appeared to be an isolated occurrence, and the planned corrective actions appeared to be adequate to prevent recurrence.

c. Conclusions

The licensee was required to enter a second forced outage to repair relief valve RV-2013 bellows. An operator workaround for CVCS pressure control, in conjunction with material condition problems on the turbine stop valve bypass valves and an unusual CVCS system configuration resulted in an RV-2013 bellows failure. The inspectors concluded that adequate corrective actions had been planned or taken to prevent recurrence of this problem.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707 and 61726)

The inspectors observed all or portions of the following work and surveillance activities:

Work Order No:

- 24712528 Diagnostic testing for control Valve (CV)-0733 hotwell makeup valve
- 24712459 Emergency diesel generator (EDG) 1-2: calibrate jacket water, lube oil and fuel oil temperature switches, indicators and controls
- 24612117 EDG 1-2: install room cooling fan V-24C controls

- 24714364 MO-0510 main steam isolation valve bypass valve: replace leaking stuffing box plug
- 24714556 Safety injection tank T-82C: troubleshoot fuse S46-1 circuitry. Fuse blew during safety injection system actuation logic testing

Surveillance Activities

- | | |
|-------|--|
| SOP-3 | Safety Injection and Shutdown Cooling System (special test for high pressure safety injection min-flow check valves) |
| QO-1 | Safety Injection System |

b. Observations and Findings

The inspectors noted that the work was conducted in a professional and thorough manner. All work observed was done with the work package present and in active use. Work packages were comprehensive for the task and post maintenance testing requirements were adequate. The inspectors frequently observed supervisors and system engineers monitoring work. When applicable, work was done with the appropriate radiation control measures in place. Overall, the inspectors observed good procedure adherence with good maintenance and radiation work practices. However, the inspectors noted a weakness in the repairs to the main steam bypass valve in that once all preparatory work was done, no single individual had overall responsibility for scheduling and completing the repair. Specific observations are detailed below.

M1.2 Repairs to Leak on Main Steam Bypass Valve

a. Inspection Scope (62707)

On November 4, 1997, a small steam leak was identified on the bonnet of MO-0510, the steam generator "A" main steam isolation valve (MSIV) bypass valve. The leak was coming from a set screw improperly used as a plug. On November 22, the inspectors attended the pre-job brief and observed the work in progress. The work order package and post maintenance test were also reviewed.

b. Observations and Findings

The valve repair work was done by the licensee's temporary leak repair contractor. The inspectors noted that the pre-job brief was detailed and that there was extensive licensee oversight during pre-job planning. However, the inspectors did identify a weakness in supervisory oversight of the work in progress. Once all preparatory work was done by the departments involved, no single individual had overall responsibility for scheduling and completing the repair. The inspectors did not note any deficiencies in the manner in which the work was performed. No more leakage had been observed by the end of the inspection period.

This repair was of particular concern due to contractor and job control issues identified in connection with repairs to the main steam isolation valves (detailed in Inspection Report Nos. 50-255/96017 and 50-255/97005). The inspectors followed up on the licensee's review of the original non-code repair done on MO-0510. A contractor performed a temporary leak repair to MO-0510 offsite under specification change (SC)-92-109 which also specified the permanent repair method. However, the permanent repair was made under a different work order than the SC, and the second work order did not reference the original SC. Therefore, with no directions to follow, the repair was made using an incorrect part (set screw, vice a high pressure pipe plug), with a resultant leak. The apparent cause of this condition was a failure of the work order process. Additional details concerning the temporary repair are discussed below in Section E1.2.

The licensee reviewed a list of all temporary leak repairs done at Palisades over approximately a ten year period. If the repair documentation was questionable, the permanent repairs were checked visually in the field. No other questionable repairs were found. The licensee's investigation into the 1996 valve refurbishment was still ongoing.

c. Conclusions

The licensee's preparation for and conduct of the work for the main steam bypass valve repair was good. However, the inspectors noted a weakness in management oversight of the job. Once all preparatory work was done, no single individual had overall responsibility for scheduling and completing the repair.

III. Engineering

E1 Conduct of Engineering

E1.1 Atmospheric Steam Dump Valve Appendix R Issue

a. Inspection Scope (37551)

The inspectors reviewed the licensee's recent findings, applicable documentation, and compensatory measures related to the Appendix R enhancement effort. Discussions were held with the system engineering supervisor and personnel supporting the effort. Future efforts to bring the Appendix R review to a close were discussed with licensee management.

b. Observations and Findings

On October 4, the licensee concluded that an unanalyzed condition existed involving a cable which runs between two control room cabinets. A single hot short in the control room cabinets or a single hot short in the cable spreading room could potentially result in all four atmospheric dump valves (ADV's) and turbine bypass valves spuriously opening due to the effects of a fire in either of the areas. The licensee also identified potential inadequacies with the engineering evaluations of some fire dampers and barriers. The licensee determined that both conditions were reportable and submitted licensee event reports.

Previous Appendix R analyses assumed that only two ADVs would spuriously open as a result of a fire. Off normal Procedure (ONP)-25.2, "Alternate Safe Shutdown Procedure," stated that with two ADVs open, control must be established within ten minutes. The new evaluation established a six minute response time to take manual action to close all four ADVs. The response time was validated on the simulator and in the plant. Procedure ONP 25.2 was revised to ensure timely completion of manual actions to close the ADVs and subsequently initiate auxiliary feedwater in the case of fire with opening of the ADVs. Operators were trained on the procedure revision.

The licensee's efforts on rebaselining fire dampers and barriers were also reviewed. The licensee intends to create design basis documents and acceptance criteria for fire dampers and barriers. Fire tours have been instituted as a compensatory measure until the analysis on the fire dampers and barriers is completed.

As follow up to earlier enforcement action for Appendix R issues that involved inadequate corrective actions, detailed in Inspection Report No. 50-255/96004, discussions were held on the present resources being applied to complete the Appendix R review. The inspectors concluded that the Appendix R review team was adequately staffed and supported. As previously discussed in Inspection Report No. 50-255/97011, the licensee's efforts were progressing slowly, but the review seemed thorough. However, in recent discussions, the engineering supervisor said that with the upcoming refueling outage, planned to commence in April 1998, the Appendix R resources may be reduced to support the outage. This concern was discussed at the exit interview. At this time, no long term reduction in the Appendix R resources are planned.

c. Conclusions

The inspectors determined that the licensee's actions were adequate to address the atmospheric dump valve hot short Appendix R scenario and rebaselining of fire dampers and barriers. The inspectors also concluded that the Appendix R review team was adequately staffed and supported. However, the inspectors were concerned with plans to potentially reduce the Appendix R evaluation effort should resources be needed to support the upcoming 1998 refueling outage. The inspectors also stressed the importance of a timely response to the longstanding Appendix R issues.

E1.2 Steam Leak on Main Steam Bypass Valve

a. Inspection Scope (37551)

The inspectors reviewed the engineering department's actions to evaluate the steam leak on main steam stop bypass valve MO-0510.

b. Observations and Findings

The leak was coming from a set screw improperly used as a plug (discussed in Section M1.2). Steam leakage from the bypass valve to the atmosphere could result in the release of radioactivity outside containment if steam generator tube leakage existed; however, none of the steam generators currently exhibit tube leakage.

The set screw had been installed in the bonnet of MO-0510 during valve refurbishment done in the 1996 refueling outage. The set screw was used to plug a leak sealing injection port as part of a 1993 packing leakage repair. The steam was leaking around the circumference of the set screw. The valves are designated as Class II pressure boundaries per Section XI of the American Society of Mechanical Engineers Code.

On November 4, 1997, a meeting was held to determine the operability of the MSIV bypass with bonnet leakage. The leakage was determined to be from a mechanical joint in the valve and did not affect operability of the valve; however, the licensee began planning repairs to stop the leakage. Additionally, engineering personnel did a stress analysis for the existing configuration, using worst case plug material and the measured thread engagement. The existing plug thread engagement was determined to be adequate.

On November 6, 1997, additional meetings were held to discuss the time line for repairing MO-0510. Analyses were done to document the continued operability of the valve with the existing amount of leakage and with increased leakage. A course of action was implemented for the operators to follow until the formal work process was developed for the repairs. The plan required the operators to monitor valve leakage and shut down the unit if steam leakage increased to that equivalent from an unplugged hole of the same diameter (3/8-inch).

As part of the repair planning effort, the licensee's engineering staff requested a radiography of the valve bonnet to determine the exact nature of the required repairs. Review of the radiographs revealed that the initial repair was not in accordance with the specifications provided to the repair contractor. Specifically, the set screw thread engagement and use of a set screw for this purpose was suspect. A pipe plug should have been installed. A non-code repair on the main steam isolation valves was the subject of an earlier Violation (50-255/97008-01). As discussed above in Section M1.2, the licensee conducted a review of all temporary valve repairs completed during the last ten years and found no additional examples of a non-code repair; therefore, the inspectors considered the non-code temporary repair to MO-0510 as an additional example of Violation 50-255/97008-01.

c. Conclusions

The engineering department's operability evaluation and assistance for preparations for the repairs to main steam isolation valve (MSIV) MO-0510 were thorough. The engineering department's efforts had improved over those associated with previous similar MSIV repairs.

IV. Plant Support

P1 Conduct of Emergency Preparedness (EP) Activities

P1.1 EP Drill Observations

a. Inspection Scope (71750)

The inspectors observed activities in the operational support center (OSC) and in the plant for an EP Drill. The subsequent OSC drill critique was also observed.

b. Observations and Findings

The drill scenario had an explosion occur in track alley with no radioactive release. There was an individual simulated injured in the explosion. The inspectors noted that the licensee waited until the conclusion of the personnel accountability phase, which identified that an individual was unaccounted for, before sending a search and rescue team to look for the missing individual. Further time was then spent getting the team ready to go into the plant to search for the individual. No emphasis was placed on locating the missing individual given that a serious event had occurred in which personnel could have been injured.

The licensee's post-drill critique was observed. The inspectors noted good participation in the critique by licensee personnel. Licensee personnel expressed frustration with their inability to make a timely response to the "injured" individual. The drill coordinators noted the weaknesses and stated efforts would be made to look at improving response times.

c. Conclusions

During an emergency preparedness drill, the licensee identified a deficiency involving a prolonged period of time before a search and rescue team was sent to find a simulated injured individual. The licensee stated that a review will be performed to correct the response timeliness concerns.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on December 5, 1997. No proprietary information was identified.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. A. Fenech, Senior Vice President, Nuclear, Fossil, and Hydro Operations
T. J. Palmisano, Site Vice President - Palisades
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J. P. Pomeranski, Manager, Maintenance
D. G. Malone, Shift Operations Supervisor
M. P. Banks, Manager, Chemical & Radiation Services

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities

ITEMS OPENED

50-255/97013-01	VIO	Operators failed to meet TS requirements for starting of a primary coolant pump
50-255/97013-02	VIO	Inadequate procedure allowed operators to determine primary coolant pump start criteria not in accordance with TSs

ITEMS CLOSED

None

LIST OF ACRONYMS USED

ADV	Atmospheric Dump Valve
CFR	Code of Federal Regulations
CRDM	Control Rod Drive Mechanism
CV	Control Valve
CVCS	Chemical Volume & Control System
DRP	Division of Reactor Projects
EDG	Emergency Diesel Generator
IP	Inspection Procedure
LTOP	Low Temperature Overpressure
MO	Motor Operated (valve)
MSIV	Main Steam Isolation Valve
NCO	Nuclear Control Operator
NRC	Nuclear Regulatory Commission
ONP	Off Normal Procedure
OSC	Operational Support Center
PCP	Primary Coolant Pump
PCS	Primary Coolant System
PCV	Pressure Control Valve
PDR	Public Document Room
QO	Quarterly Operating (procedure)
RV	Relief Valve
SC	Specification Change
SDC	Shutdown Cooling
SIS	Safety Injection System
SOP	System Operating Procedure
TS	Technical Specification
VIO	Violation