

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 50-255/97018(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: December 6, 1997, through January 27, 1998

Inspectors: P. Prescott, Resident Inspector
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Approved by: Bruce L. Burgess, Chief
Reactor Projects Branch 6

EXECUTIVE SUMMARY

Palisades Nuclear Generating Plant NRC Inspection Report No. 50-255/97018

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

Operations

- The operators responded appropriately to a loss of component cooling water event that occurred on January 1, 1998. The licensee established an incident response team (IRT) to investigate the circumstances surrounding the event, and the inspectors concluded that the IRT's findings and proposed corrective actions were thorough. However, the inspectors identified several IRT weaknesses, most significantly, the team's lack of understanding of Generic Letter 91-18 regarding degraded conditions. The inspectors discussed the weaknesses with licensee management and concluded that the corrective actions taken or planned were adequate (Section 01.2).
- Following the discovery of a mispositioned valve at a nitrogen station, the licensee instituted an equipment status control record to enhance the operations department's control of equipment. To date, no discrepancies have been identified (Section 01.3).

Maintenance

- The inspectors concluded that the spent fuel pool maintenance activity to repair body to bonnet leaks on two valves, MV-SFP131 and MV-SFP132, was well planned and executed. However, the inspectors noted one deficiency in that the nuts and bolts on the valves were heat treated steel instead of stainless steel. An unresolved item was opened pending a review of the licensee's evaluation of the nuts and bolts (Section M1.2).

Engineering

- During follow up to a March 1997 failure of CV-3018 to reposition, the inspectors concluded that the corrective action for air line filter placement for pressure control valves (PCVs) was inadequate in that the licensee failed to correct a previously identified condition adverse to quality. The inspectors further concluded that placement of low point drains in the air lines leading to the PCVs was inadequate. The low point drain problem and the lack of corrective action for the air filter placement problem led to failure of CV-3018's air regulator. A violation of NRC requirements was identified (Section E1.1).
- The inspectors concluded that the system engineer had adequately prepared to perform leak checks on the radwaste evaporator component cooling water supply and return valves. However, the inspectors noted that the system engineer did not communicate to the control room supervisor all of the activities performed in preparation of valve testing (Section E1.2).

- Three 10 CFR 50, Appendix R, issues were of concern because of the safety significance associated with plant equipment configuring that did not meet 10 CFR Part 50, Appendix R, safe shutdown requirements for a design basis fire. These issues would normally be designated as a Severity Level III problem in accordance with the NRC's NUREG-1600, "General Statement of Policy and Procedures for NRC Enforcement Actions," (Enforcement Policy). However, enforcement discretion will be used in accordance with Section VII.B.3, "Violations Involving Old Design Issues," of the Enforcement Policy and a Notice of Violation will not be issued. The decision to apply enforcement discretion was based on consideration of the following: 1) significant NRC enforcement action (EA 96-131) was taken against the Consumers Energy Company for several examples of a failure to take prompt corrective actions related to Appendix R deficiencies. Palisades identified the issues detailed above and promptly notified the NRC; 2) corrective actions were immediate and encompassed the root causes for these issues; 3) some of the issues were related to activities that were in progress before the enforcement action was issued; 4) the issues would not be classified at a severity level higher than Severity Level III; and 5) Consumers Energy Company met with the NRC to explain their efforts to resolve these issues, which were outlined in their reply dated September 12, 1996.
- During a closeout of a licensee event report, the inspectors identified a non-cited violation for failure to meet Technical Specifications testing requirements of the emergency escape air lock (Section E8.3).

Plant Support

- The inspectors concluded that radiological practices observed during the maintenance activities and plant daily walkdowns were adequate.

Report Details

Summary of Plant Status

The plant operated at full power for the entire inspection period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

The inspectors conducted frequent reviews of ongoing plant operations. The conduct of operations was considered by the inspectors to be good; specific events and noteworthy observations are detailed below.

O1.2 Component Cooling Water Leak

a. Inspection Scope (71707 and 40500)

On January 1, 1998, a loss of component cooling water (CCW) inventory occurred which was greater than the CCW surge tank makeup capacity. The inspectors followed up on the circumstances surrounding the event, the licensee's investigation, and the corrective actions for the loss of CCW.

b. Observations and Findings

Event Description:

On December 24, 1997, plant operators identified a leaking air solenoid on the radwaste evaporator CCW return valve, CV-0977B. After discussing the leak with system engineering and management, the operators decided to place CV-0977B in its safety function position by closing the valve. Closing CV-0977B resulted in isolating CCW flow and pressurizing the cooler to full CCW system pressure. Because there was no immediate need to process radioactive waste, the licensee planned to repair the valve two weeks later.

On December 28, 1997, the operators identified a CCW leak on the "A" radwaste evaporator distillate cooler head gasket flange. The leak was approximately 100 milliliters per minute. On the following day, the fix-it-now team determined that tightening the flange could cause the leakage to increase.

On January 1, 1998, the leak rapidly increased to 200 gallons per minute (gpm), exceeding the CCW surge tank makeup capability of 135 gpm. The operators first became aware of the problem when a remote panel annunciator alarmed for high level in the auxiliary building sump. While the operators were taking actions to isolate the "A"

evaporator distillate cooler, the CCW surge tank alarm annunciated in the control room. The operators entered Off Normal Procedure (ONP) 6.2, "Loss of CCW," and isolated the CCW leak. After the leak was isolated, the CCW system was refilled; however, the system required several venting evolutions over the following two days.

Operator Response:

After the CCW surge tank alarm annunciated in the control room, the operators entered Off Normal Procedure (ONP) 6.2, "Loss of CCW." The shift supervisor directed that the reactor be tripped and primary coolant pumps (PCPs) secured if abnormal CCW pump operating conditions were noted. These actions were more conservative than the ONP guidance. Also, the shift supervisor determined that starting a standby CCW pump would have worsened the low CCW inventory problem and resulted in the air-binding of the CCW pumps. Therefore, contrary to the ONP, the operators did not start another CCW pump. The operators recovered surge tank level before CCW flow was disrupted to the PCPs.

The inspectors concluded that operator response to the event was appropriate and timely. The operators avoided a reactor trip and potential damage to the PCP seals. The inspectors also noted that the shift supervisor conservatively decided to trip the reactor should any significant operational problem occur with the CCW system or PCP seals. The licensee's incident response team (IRT) noted a weakness in the event response in that the shift supervisor did not announce the decision not to start the standby CCW pumps to the shift crew.

Also, the licensee failed to recognize the potential for degradation to the CCW system. Based on the number of venting evolutions, air entrapment in the CCW system was significant; however, the licensee determined that the system was operable because it had met system performance requirements. The inspectors concluded that the licensee's operability determination was weak in that it did not account for the significant inventory loss and air entrapment.

Incident Response Team Performance:

As documented in Inspection Report No: 50-255/97014, the NRC had identified a weakness in the licensee's response to the failure to recognize all control rods out of service while at power. Following the loss of CCW on January 1, 1998, the licensee established an incident response team (IRT) to investigate the circumstances surrounding the event. The IRT appropriately prioritized significant corrective actions and ensured that the actions were completed in a timely manner. Overall, the licensee's IRT evaluation resulted in a thorough understanding of the event. However, the inspectors noted several IRT weaknesses. The most significant weakness was that the IRT personnel did not have a thorough understanding of Generic Letter 91-18 as it applied to the loss of CCW event. Generic Letter 91-18 addressed operability of systems, structures and components and the resolution of degraded and nonconforming conditions. The initial condition report for the loss of CCW surge tank did not recognize that the CCW system was degraded but operable. Declaring the system inoperable or degraded would have required an operability evaluation to be documented.

Also, IRT personnel did not request an analysis of the loss of CCW event in terms of its effect on core damage frequency. The inspectors discussed a loss of CCW with the primary coolant pump system engineer. The inspectors were concerned that the licensee's engineering staff did not have an understanding of what would happen to the PCP seals after a 10 minute loss of CCW. The licensee is presently discussing this matter with the seal vendor. Another weakness noted by the inspectors was that the IRT process was not formalized in that it had not been proceduralized. The licensee originally planned to complete this action item by the end of January 1998. The inspectors discussed these weaknesses with licensee management and concluded that the corrective actions taken or planned would adequately address the problems.

c. Conclusions

The operators responded appropriately to a loss of component cooling water event that occurred on January 1, 1998. The licensee established an incident response team (IRT) to investigate the circumstances surrounding the event, and the inspectors concluded that the IRT's findings and proposed corrective actions were thorough. However, the inspectors identified several IRT weaknesses, most significantly, the team's lack of understanding of Generic Letter 91-18 regarding degraded conditions. The inspectors discussed these weaknesses with licensee management and concluded that the corrective actions taken or planned were adequate.

O1.3 Nitrogen Station Valve Mispositioned

a. Inspection Scope (71707)

During performance of surveillance MO-29, "Engineered Safety System Alignment," nitrogen bottle isolation Valve MV-N2-126 was found closed. The inspectors reviewed corrective actions taken for the mispositioning of a nitrogen station bottle isolation valve.

b. Observations and Findings

The purpose of surveillance MO-29 was to determine by inspection that Technical Specification (TS) limiting conditions for operations are not being violated by misalignment of valves, breakers, or controls contained within or affecting engineered safety systems. Valve MV-N2-126, an isolation valve to a nitrogen bottle associated with nitrogen station 3B, was checked as part of the surveillance and found closed contrary to its normally open position. The licensee investigated the mispositioned valve. While performing maintenance on nitrogen station 3B, an auxiliary operator closed the supply valves on the nitrogen header to provide added personnel protection due to a leaking cap on a test connection. This action was logged in the secondary plant log. However, when the auxiliary operator went to restore the nitrogen bottle isolation valves, Valve MV-N2-126 was missed. The inspectors concluded that the safety significance of this event was minor because the instrument air system was available.

Corrective action for this event was the development of an equipment status control record. Equipment operated in the plant not covered by any controlling document was to be listed on this record. The inspectors questioned several operators to ascertain whether or not sufficient controls were in place to review and store completed valve record sheets. The inspectors found that the record sheets were not being reviewed or

saved. The issue was discussed with the operations superintendent, and the operations superintendent agreed it would be prudent to retain and periodically review the record sheets.

c. Conclusions

Following the discovery of a mispositioned valve at a nitrogen station, the licensee instituted an equipment status control record to enhance the operations department's control of equipment. To date, no discrepancies have been identified.

O8 Miscellaneous Operations Issues (92701 and 92901)

O8.1 (Closed) IFI 50-255/94014-06: Control room ventilation noise was considered a distraction in the control room. The licensee evaluated this concern from the Diagnostic Evaluation Team inspection and performed modifications to quiet the airflow. Silencers were installed by temporary modification TM-95-107 and made permanent by the engineering specification change SC-95-073. Main control room silencers and a balance damper were installed under specification change SC-97-027. The inspectors and operating personnel interviewed have noticed a significant reduction in control room ventilation noise. This item is closed.

O8.2 (Closed) Violation 50-255/96008-01: Failure to have a senior reactor operator in the control room at all times. On August 9, 1996, the control room supervisor left the control room with no other senior reactor operator (SRO) present. The control room supervisor entered the viewing gallery, which is adjacent to the control room. The control room supervisor was out of the control room less than one minute. On August 13, 1996, a similar occurrence resulted when the shift engineer, who temporarily relieved the control room supervisor as the SRO in the control room, briefly left to file a work order in the adjacent technical support center. The shift engineer was out of the control room approximately one minute. Extensive remodeling of the control room was ongoing in both instances. In each case, the SRO went to an area that was normally part of the control room envelope but had been temporarily relocated outside the control room.

Immediate corrective actions for the first event included a reminder in the Daily Orders regarding control room staffing, and operations management discussed the event with the involved SRO. Also, the door between the control room and the temporary shift engineer's desk was closed in an attempt to make it less convenient for an SRO to leave the control room inadvertently. Operations management discussed with the available SROs their responsibility to maintain an SRO in the control room at all times. An entry was also made on the SRO turnover sheet as a reminder for SROs that had not participated in the discussion.

In addition, the control room remodeling project has been completed. The shift supervisor, shift engineer and control room supervisor work areas have now been restored to their normal locations. This item is closed.

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 activities:

Work Order No:

- 24713751 PCV-0522A, Alternate steam supply to AFW pump P-8B: Calibrate Controller. Steam pressure setting has drifted below setpoint
- 24713416 P-7C Service water pump: Perform preventive maintenance on Breaker 152-205
- 24710557 Nitrogen station 1A: Replacement of check valve and manifold valves on
- 24714900 SV-0977B, CCW return from radwaste evap.: Removal, replacement and testing of leaking solenoid valve
- 24510530 MV-SFP 131, spent fuel pool supply valve to shutdown cooling heat exchanger: Repair body to bonnet leak
- 24002261 MV-SFP 132, spent fuel pool return valve from shutdown cooling heat exchanger: Repair body to bonnet leak
- 2410939 MV-SFP 512, instrument isolation valve to spent fuel pool heat exchanger E-53B: Lap valve seat and repair body to bonnet leak

Surveillance Activities

- SOP-3 Safety Injection and Shutdown Cooling System (Safety injection tank sampling)
- Q0-23 Auxiliary Hot Shutdown Panel Instrumentation Checks
- M1-39 Auxiliary Feedwater Actuation System Logic Test
- M1-3 Reactor Protection Matrix Logic Tests
- M1-3 Venting of the CCW System
- QO-21C Inservice Test Procedure - Auxiliary Feedwater Pump P-8C

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. Specific events and noteworthy observations are noted below.

The inspectors noted that the spent fuel pool maintenance activity was well planned and executed; however, one deficiency was noted. The nuts and bolts on the valves and at the job site for contingency use were heat treated steel instead of stainless steel. This issue is discussed in detail in Section M1.2.

The inspectors observed the auxiliary operators at the hot shutdown panel. The inspectors noted that the off-normal procedure and emergency operating procedures were stored inside the cabinet. The inspectors were concerned that the manuals could move around during a seismic event and damage control wiring in the panel. A condition report was generated, and the manuals were removed from the panel. The inspectors reviewed the operability determination, which was found adequate.

During replacement of two manifold valves on Nitrogen Station 1A, the inspectors noted that maintenance technicians demonstrated a proper questioning attitude by notifying their supervisor of a tagout deficiency before starting work on the nitrogen station. Operations personnel had removed the hoses from the nitrogen bottles and tagged the hoses. This meant that the maintenance technicians would have had to remove the tagged isolation boundary from the manifold valves, which posed no personnel safety risk, but was contrary to procedural requirements of Administrative Procedure AP 4.10, "Personnel Protective Tagging." Operations edited the switching and tagging order, and removed the tags. Reinstallation of the hoses was covered in the restoration activities.

c. Conclusions

Overall, the inspectors observed good procedure adherence and maintenance and radiation work practices. Two identified deficiencies were promptly corrected; however, the inspectors identified a concern regarding the use of heat treated steel nuts and bolts on two spent fuel pool valves.

M1.2 Spent Fuel Pool System Maintenance Outage

a. Inspection Scope

The inspectors reviewed the licensee's preparatory activities and observed portions of the spent fuel pool valve maintenance. Discussions were held with the maintenance planner and system engineer. Observations of the prejob brief, the spent fuel pool draindown evolution, portions of the valve maintenance activities, and the post-maintenance critique were conducted.

b. Observations and Findings

The purpose of the spent fuel pool maintenance outage was to repair body to bonnet leaks on two valves, MV-SFP131 and MV-SFP132. Performance of the repairs required lowering the spent fuel pool approximately three feet. This would bring the level below the suction for the spent fuel pool pumps. Portions of the spent fuel pool system piping above the valves also had to be drained. The risk of this maintenance activity was potential loss of positive control over fuel pool level and water temperature.

The inspectors discussed the activity with the system engineer and planner. It was evident from the procedure and schedule that the activity was well planned. Adequate controls were in place to monitor spent fuel pool level and temperature. Also, planned radiological precautions were adequate to account for potential airborne contamination when the uncovered portion of the spent fuel pool walls dried out and when the spent fuel pool system integrity was breached during maintenance activities on the valve bonnets. The schedule allowed for a sufficient margin to avoid exceeding administrative limits for fuel pool temperature. Blank flanges were made as a contingency if the system integrity had to be restored once the valves were apart.

The inspectors observed the tagout and draining of the spent fuel pool and piping. The activity by the operations shift was well executed and controlled. The inspectors noted good oversight of the evolution by the shift supervisor. The maintenance activity went well; no deficiencies were noted. However, the inspectors noted that the extra nuts and bolts at the job site for contingency use were heat treated steel. Also, nuts and bolts on the valves body to bonnet connections were heat treated steel. These should have been stainless steel, because the spent fuel pool has borated water. The inspectors brought this to the system engineer's attention. Generic Letter 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," and several information notices have addressed this issue. Also, the inspectors had discussed with licensee management this concern pertaining to the spent fuel pool system. The inspectors considered this issue to be an unresolved item (50-255/97018-02) pending a review of the licensee's evaluation of the heat treated steel nuts and bolts.

The licensee was reviewing purchase order requirements as to why the steel nuts and bolts were considered acceptable. The maintenance outage was completed ahead of schedule. Operations restored the fuel pool system integrity and refilled the spent fuel pool.

c. Conclusions

The inspectors concluded that the spent fuel pool maintenance activity to repair body to bonnet leaks on two valves, MV-SFP131 and MV-SFP132, was well planned and executed. However, one deficiency was noted in that the nuts and bolts on the valves were heat treated steel instead of stainless steel. An unresolved item was opened pending a review of the licensee's evaluation of the nuts and bolts.

III. Engineering

E1 Conduct of Engineering

E1.1 Review of Engineering Corrective Actions and Evaluations of Air Systems

a. Inspection Scope (37551)

On March 18, 1997, CV-3018, Safety Injection Tank Test Line Redundant High Pressure Injection Isolation Valve, failed to change position during a surveillance test because its air regulator was plugged with rust. The inspectors reviewed NUREG-1275 Volume 2, "Operating Experience Feedback Report - Air System Problems," and the licensee's corrective actions and evaluation of Generic Letter 88-14. The inspectors also inspected improvements made to the instrument air system and high pressure air system.

b. Observations and Findings

One of the licensee's evaluations supporting the response to Generic Letter 88-14, ATRN-88-55, dated February 15, 1989, stated, in part:

"Another issue to be resolved is the placement of satellite filters in the airlines. Most of the filters are installed downstream of pressure regulating valves. . . . However, the regulators then go unprotected from larger airline particles which could cause regulator failure."

Inspection Report No. 50-255/97005 discussed the failure of CV-3018 to reposition in March 1997. In addition to discussing safeguards high pressure air system drawing discrepancies, the inspection report documented the inspectors' concern about the placement of the air filters:

"The inspectors reviewed the safeguards high pressure air system drawings and noted that not all pressure control valves (PCVs) were configured the same. Some PCVs had the air filters upstream of the valve, as would be expected. However, the majority of the filters were located downstream of the PCVs and system engineering was aware of the discrepancy. However, the inspectors were concerned that this was a longstanding issue which had not been resolved."

The safety function of CV-3018, a fail-close valve, is to close or remain closed. However, CV-3018 is opened in Emergency Operating Procedure Supplement 20 for alternate hot leg injection, and it is also used in Off Normal Procedure (ONP) 25.2 as an optional makeup path if all charging pumps have been lost. The filter for CV-3018 was downstream of the valve; therefore, it was one of the valves previously identified as susceptible to regulator failure. 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. In 1989, the licensee identified that filter placement downstream of the valve could lead to regulator failure due to airline particulate, a condition adverse to quality. In March 1997, CV-3018 failed to reposition as expected during a surveillance due to airline particulate (rust). The failure to correct an identified condition adverse to quality is considered a violation of 10 CFR Part 50, Appendix B, Criterion XVI (50-255/97018-01).

Inspection Report No. 50-255/97005 concluded the discussion of the failure of CV-3018 with the following:

"System engineering has since scheduled PM activities to inspect and clean selected PCVs; specifically, those that have filters downstream of the PCVs. These have been determined most susceptible to plugging. System engineering was reviewing the feasibility of modifications to improve system reportability. One of the corrective actions instituted to help remove moisture from the high pressure air system in the west safeguards room was the practice of blowing down the low point drains on a monthly basis."

On December 2, 1997, the inspectors identified a low point section of the air supply line, 48 feet long, which had no drains, resulting in approximately 6 cubic feet of air line which could not be drained. CV-3018 was on a downstream section of line which taps off the 48-foot low point section of the air supply line. Therefore, the practice of blowing down the air line did not remove moisture from the lines leading to CV-3018, and rust accumulated to the point where the regulator became plugged. The inspectors concluded that the low point drain problem and the lack of corrective action for an air filter placement problem led to failure of the air regulator.

Work request No. 251837 was written on December 3, 1997, to install two new low point drains in the west safeguards room high pressure air system per engineering assistance request (EAR) 97-0729. EAR 97-0729 also requested a change to the surveillance requiring weekly air system blow downs to include these two new locations.

c. Conclusions

During follow up to a March 1997, failure of CV-3018 to reposition, the inspectors concluded that the corrective action for air line filter placement for pressure control valves (PCVs) was inadequate in that the licensee failed to correct a previously identified condition adverse to quality. The inspectors further concluded that placement of low point drains in the air lines leading to the PCVs was inadequate. The low point drain problem and the lack of corrective action for the air filter placement problem led to failure of CV-3018's air regulator. A violation of NRC requirements was identified.

E1.2 Radwaste Evaporator Isolation Valve Testing (37551)

a. Inspection Scope

During recovery from the loss of component cooling water inventory discussed above in Section O1.2, the licensee noted that some of the radwaste evaporator isolation valves were leaking by. The inspectors reviewed the licensee's preparations for troubleshooting the affected valves, CV-0944, component cooling water (CCW) supply isolation valve to the radwaste evaporators and CV-0977, CCW return isolation valve to the radwaste evaporators.

b. Observations and Findings

The inspectors observed the cognizant system engineer brief the control room supervisor prior to conducting testing of both CCW valves. The system engineer planned to use an informal guideline to perform the test rather than a procedure. When the control room

supervisor questioned the system engineer as to the implications of unisolating the affected portion of the CCW system, the system engineer did not have a response. Therefore, the control room supervisor determined that he did not have enough information to conduct the test.

The inspectors have also identified past weaknesses with informal testing by the licensee. Examples included the turbine vibration testing that failed to set limits on the amount of vibration allowed before stopping testing (IR 50-255/97009) and spent fuel pool rate of temperature rise that had no set temperature limits (IR 50-255/96007). However, testing performed in accordance with a procedure required a safety evaluation and management approval.

The inspectors reviewed the activities completed in preparation for valve testing. Design engineering had prepared an evaluation in the event that one or both of the valves failed to close during the test. The inspectors reviewed the document and found that various potential design basis accidents had been addressed. Also, system engineering had completed an evaluation of all gasketed joints in the radwaste evaporator system. The remaining gasketed joints had flexitallic gaskets, and the distillate cooler joint had been properly repaired. System engineering had revised the operability evaluation on the supply and return valves to include the leakage noted by the valve seats after the loss of CCW inventory had occurred.

The system engineer held another brief with the control room supervisor and discussed the completed evaluations. The control room supervisor approved the test and the testing was completed with no unexpected results.

c. Conclusions

The inspectors concluded that the system engineer had adequately prepared to perform leak checks on the radwaste evaporator component cooling water supply and return valves. However, the inspectors noted that the system engineer did not communicate to the control room supervisor all of the activities performed in preparation of valve testing.

E1.3 Motor Operated Valve T-Drain Issue

a. Inspection Scope (37551)

The inspectors reviewed the licensee's response to a significant events report issued by another utility that concerned defective T-drains on environmentally qualified motor operated valves (MOVs). Discussions were held with the component engineering supervisor, who is responsible for MOVs. The applicable condition report and preventive maintenance documents were also reviewed to ensure an adequate response to this concern by the licensee.

b. Observations and Findings

Recently, two separate utilities discovered vendor supplied T-drains installed on safety-related MOVs without drilled drain holes. The purpose of the T-drain on the MOV motor housing is to relieve moisture buildup in a harsh environment following a major accident.

The vendor supplied T-drains were not drilled and would act as a pipe plug rather than as a drain. The vendor and other utilities were not able to identify a particular batch or manufacturing time frame for the defective parts.

This condition was identified at Palisades on November 6, 1996, during inspection of a new motor. However, the potential generic industry implications were missed. Following the identification of this problem (C-Pal-96-1338), several corrective actions were implemented. Spare T-drains and environmentally qualified motors were examined to ensure a proper drain path had been drilled; all T-drains and motors were found acceptable. Additionally, the procurement engineering check list (PEC-93-001-0010) was revised to require receipt inspection of T-drains and the T-drains on motors. Following the recent identification of a similar problem at other utilities, the licensee revised the preventive maintenance procedures to ensure a more thorough inspection of the T-drains.

The licensee reviewed the test data for the 15 environmentally qualified MOVs installed inside containment which have T-drains. Based on a review of the original test procedure and engineering judgement, the licensee declared the potentially affected MOVs operable. The licensee's engineering staff also concluded that the environmental parameters from the original test procedure were acceptable for qualification at Palisades for new motors. The inspectors reviewed the licensee's operability evaluation and associated documentation and had no concerns.

c. Conclusions

The inspectors concluded that the licensee's response to a generic issue regarding motor operated valve T-drains was adequate. The inspectors had no concerns with the licensee's operability determination.

E8 Miscellaneous Engineering Issues (92700 and 92903)

E8.1 Enforcement Panel Review of Appendix R Issues

a. Inspection Scope

A NRC enforcement panel reviewed the licensee's corrective actions taken in response to three reportable Appendix R 50.72 events involving conditions outside the design basis. The three Appendix R design issues pertained to: 1) improper evaluation for the effects caused by spurious operation of component cooling water/service water interface valves; 2) alternate shutdown procedures that did not incorporate the Appendix R assumption that all reactor coolant pumps would be tripped if a fire caused an evacuation of the control room; and 3) inadequate evaluation for the effects caused by spurious opening of the atmospheric steam dump valves. Details of the first two issues were outlined in Inspection Report No. 50-255/97011. Details of the atmospheric dump valves were outlined in licensee event report (LER) 97-010.

b. Observations and Findings

The three Appendix R issues were reviewed by an NRC enforcement panel on October 30, 1997, including the licensee's corrective actions.

Design Issue One

On September 12, 1997, the licensee made a one hour nonemergency 10 CFR 50.72 notification for being in a condition outside of design bases. The Appendix R event involved a control room fire, which generated a hot short condition of a control valve solenoid resulting in a spurious actuation of a service water (SW) system interface valve. The part of the SW system involved was the seal cooling water for the essential safety system (ESS) pumps. The most limiting scenario calculated that only 25 seconds would be available to close engineering safeguards pump cooling service water return valve, CV-0951. This valve is normally closed. An open item of this Appendix R analysis acknowledged the 25 second requirement, but concluded since the ESS pumps are not running during normal operation and the component cooling water (CCW) supply and return Valves (CV-0913 and CV-0950, respectively) to the ESS pumps' sealing cooling piping are normally closed, then the spurious opening of any one CCW/SW interface valve could not result in the loss of CCW inventory. Based on this information, another analysis did not consider actions for the required time period. This reasoning is in error because CV-0913 and CV-0950 are normally open and fail open on loss of air or loss of electric power. A single spurious operation of CV-0951 would require a 25 second operator response to mitigate the consequences, which is not possible.

On September 24, 1997, permanent placards were placed in the control room to indicate that the air supply valves were permanently closed. The valves were also placed on the system checklist with the normal position indicated as "closed."

Design Issue Two

On September 23, 1997, the licensee reported the second issue to NRC via a 10 CFR 50.72. It involved the Appendix R analysis assuming all four primary coolant pumps being tripped if the fire causes an evacuation of the control room. The Off Normal Procedure (ONP) for Alternate Shutdown did not reflect the analysis and only directed the operators to trip two of the four primary coolant pumps.

Procedure ONP-25.2, "Alternate Safe Shutdown Procedure," did not specifically address securing all the primary coolant pumps when the operators lose the ability to monitor the pumps, such as during a control room evacuation or a damage to the instruments. Procedure ONP 25.2 provided guidance for fires where a control room evacuation was to take place and fires where the control room is still manned. The procedure assumes that monitoring of the primary coolant pumps is a condition of their continued operation.

Several fire scenarios could result in a loss of component cooling water (CCW) to the primary coolant pump seals and bearing coolers. Upon leaving the control room, operators do not have primary coolant pump monitoring capability or instrumentation to monitor the CCW system. The licensee's design basis for the primary coolant pumps indicated they are designed to operate without seal cooling for periods of up to ten minutes. Immediate corrective action was to initiate a procedure revision to direct operators to trip all four primary coolant pumps prior to control room evacuation. Operator training includes the necessity of CCW for primary coolant pump for operation, therefore the operators may secure primary coolant pumps when CCW could no longer be monitored.

Design Issue Three

On September 30, 1997, the inspectors were notified of a design vulnerability involving the inadvertent simultaneous opening of all four atmospheric steam dump valves discovered during a review of Appendix R documents. The event which may trigger this response is a smart hot short in any one of three cable segments not previously identified. The three cable/wire segments are in the atmospheric dump control circuitry, and are physically located in two main control room panels and in a section of cable routed in a raceway in the cable spreading room.

The event involves a fire that causes a single hot short in the control room panels or a single hot short in the cable spreading room that could potentially result in all four atmospheric dump valves (ADVs) spuriously opening. An engineering analysis was conducted for a plant response with only two stuck open ADVs under Appendix R conditions. The analysis concluded that spurious operation of the control circuit during a fire scenario would only affect two ADVs because the review was limited to only the circuits identified on the circuit and raceway schedule. A cable routed between the cable spreading room and the control room where a hot short could exist and cause the deficient condition is not identified on the circuit and raceway schedule, contrary to what is normally expected. Additionally, original plant design and construction practice excluded wire and cable within the various panels in the plant from inclusion in the circuit and raceway schedule. Rather, such wire/cables are described in vendor prints for the specific panels, not in the original architect engineering's cable and raceway schedule. Thus, the scope of review of cable and raceway schedules excluded cables located internally to specific panels.

The level of plant knowledge of those involved in the analysis also contributed to the condition. Had they been aware that a single controller operated the four ADVs, it is expected the decision to only evaluate a condition with two ADVs opening would have been questioned. A lack of adequate rigor in the analysis of the control circuits led to not identifying this single common control feature.

The licensee performed an analysis and provided evidence that operators could close the ADVs within six minutes. Procedure ONP 25.2 was revised to ensure the actions are completed within the required time. Engineering is completing a new plant analysis response to address the opening of all four ADVs during the postulated fire scenarios.

The Appendix R group is continuing to perform an in-depth review of Appendix R. This effort is expected to conclude in early August 1998.

c. Conclusions

These issues are of concern because of the safety significance associated with plant equipment configuring that did not meet 10 CFR Part 50, Appendix R, safe shutdown requirements for a design basis fire. These issues would normally be designated as a Severity Level III problem in accordance with the NRC's NUREG-1600, "General Statement of Policy and Procedures for NRC Enforcement Actions," (Enforcement Policy). However, enforcement discretion will be used in accordance with Section VII.B.3, "Violations Involving Old Design Issues," of the Enforcement Policy and a Notice of Violation will not be issued. The decision to apply enforcement discretion was based on consideration of the following: 1) significant NRC enforcement action (EA 96-131) was

taken against the Consumers Energy Company for several examples of a failure to take prompt corrective actions related to Appendix R deficiencies. Palisades identified the issues detailed above and promptly notified the NRC; 2) corrective actions were immediate and encompassed the root causes for these issues; 3) some of the issues were related to activities that were in progress before the enforcement action was issued; 4) the issues would not be classified at a severity level higher than Severity Level III; and 5) Consumers Energy Company met with the NRC to explain their efforts to resolve these issues, which were outlined in their reply dated September 12, 1996.

- E8.2 (Closed) Unresolved Item No. 50-255/91014-01: Failure to perform a between-the-seals test of the escape air lock. The inspectors found that the same issues of LER 50-255/97-002 discussed in Section E8.3 of this inspection report, were pertinent to the closeout of this unresolved item. This item is closed.
- E8.3 (Closed) Licensee Event Report No. 50-255/97002-00: Failure to perform a between-the-seals test of the escape air lock after each use of the air lock. 10 CFR, Appendix J, requires that air locks opened during periods when containment integrity is required shall be tested within three days after being opened. Also, testing did not meet TSs, which required testing subsequent to the air lock door being opened.

Past TS surveillance testing of the escape air lock at containment design pressure with strongbacks in place caused the seals to deform due to the door design. After completion of the full pressure test, the doors must be opened to remove the strongbacks and verify seal contact with the door seating surface to ensure that the seals have rebounded to their pre-test condition. However, past test performance has shown that after the strongbacks are removed, the seals may not fully rebound, leaving gaps in the contact surface. After full pressure testing, a seal check was performed as part of the surveillance test. If the seal contact check revealed gaps, a seal adjustment was performed to ensure that the seal material rebounded to its pre-test condition. The licensee considered seal adjustment a normal part of restoration from testing that was controlled by procedure.

The licensee proposed a TS change and exemption to revise the test requirements. The change allowed performance of a seal contact check instead of an unrestrained between-the-seals test for the emergency escape air lock doors. The licensee also proposed changes to clarify the pressure requirements for the personnel airlock doors between-the-seals test. The test would be performed at less than or equal to 10 psig instead of 55 psig.

In a letter dated September 30, 1997, the NRC granted the TS change and exemption from the requirements of 10 CFR Appendix J relating to the testing of the emergency escape lock. The exemption provided relief from the requirement to perform additional air lock leakage rate testing after opening the doors for post-test restoration of seal adjustment following air lock leakage rate testing. This item is closed.

- E8.4 (Closed) Violation No. 50-255/96010-03: Failure to initiate a condition report upon discovery that Palisades was potentially susceptible to the problems noted in NRC Information Notice 96-45, "Potential Common-Mode Post Accident Failure of Containment Coolers." The reason for the violation was due to weaknesses the inspectors identified in the industry event review program and Administrative Procedure AP 3.03, "Corrective Action Process." Administrative Procedure AP 3.16 lacked guidance about what types of

information would warrant transferring an issue out of the industry experience review program and into the corrective action system. It was also weak in the guidance provided regarding processes of conditions discovered during the evaluation of industry experience information that could potentially be a safety concern for the plant. In addition, the guidelines provided in AP 3.03 as examples of when a condition report should be written were vague in their treatment of issues being processed.

Procedure AP 3.16 was revised to include guidance for reporting conditions that could potentially be a safety concern for the plant which are discovered during the review of industry experience events. The guidance included elevation to higher management levels when industry experience information is reported as applicable by multiple facilities. Procedure AP 3.03 was also revised to clarify when a condition report should be written for items being processed within the industry experience program. These procedure revisions strengthened the interrelationship between the industry experience review program and the corrective action program.

The licensee also improved the industry experience review organization and program. An individual with a technical background was assigned as coordinator of the program. The new coordinator visited several sites to review other licensees' programs. The coordinator held briefings with engineering to discuss the purpose and changes being made to the industry event review program. The industry event program was incorporated into the program health assessment process for closer management oversight. This item is closed.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls (71750)

During the resident inspection activities, routine observations were conducted in the areas of radiological protection and chemistry controls using Inspection Procedure 71750. No discrepancies were noted.

S1 Conduct of Security and Safeguards Activities (71750)

During normal resident inspection activities, routine observations were conducted in the areas of security and safeguards activities using Inspection Procedure 71750. No discrepancies were noted.

F1 Control of Fire Protection Activities (71750)

During normal resident inspection activities, routine observations were conducted in the area of fire protection activities using Inspection Procedure 71750. No discrepancies were noted.

X1 Exit Meeting

The inspectors presented the inspection results to members of the licensee management at the conclusion of the inspection on January 27, 1998. No proprietary information was identified by the licensee.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. A. Fenech, Senior Vice President, Nuclear, Fossil, and Hydro Operations
T. J. Palmisano, Site Vice President - Palisades
G. B. Szczotka, Manager, Nuclear Performance Assessment Department
D. W. Rogers, General Manager, Plant Operations
K. M. Haas, Acting Director, Engineering
S. Y. Wawro, Director, Maintenance and Planning
R. J. Gerling, Manager, Design Engineering
P. D. Fitton, Manager, System Engineering
T. C. Bordine, Manager, Licensing
J. P. Pomeranski, Manager, Maintenance
D. G. Malone, Shift Operations Supervisor
M. P. Banks, Manager, Chemical & Radiation Services
E. Chatfield, Acting Manager, Training

INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering
IP 61726: Surveillance Observations
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 71750: Plant Support Activities
IP 83750: Occupational Radiation Exposure
IP 92700: Licensee Event Reports
IP 92701: Followup
IP 92702: Followup on Corrective Action for Violations And Deviations
IP 92901: Followup - Operations
IP 92902: Followup - Maintenance
IP 92903: Followup - Engineering

ITEMS OPEN

50-255/97018-01	VIO	Inadequate corrective action for safeguards high pressure air system filter placement
50-255/97018-03	URI	Use of heat treated steel nuts and bolts on spent fuel pool valves

ITEMS CLOSED

50-255/91014-01	URI	Failure to perform a between the seals test
50-255/94014-06	IFI	Control room ventilation noise considered distraction in control room
50-255/96008-01	VIO	Failure to have a senior reactor operation in the control room at all times
50-255/96010-03	VIO	Failure to initiate a condition report
50-255/97002-00	LER	Failure to perform a between the seals test of the escape air lock after each use of the air lock

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
AFW	Auxiliary Feedwater
AP	Administrative Procedure
CCW	Component Cooling Water
CFR	Code of Federal Regulations
CR	Condition Report
CV	Control Valve
DRP	Division of Reactor Projects
GL	Generic Letter
GPM	Gallons Per Minute
IP	Inspection Procedure
IRT	Incident Response Team
LCO	Limiting Condition for Operation
LER	Licensee Event Report
MO	Monthly Operating (procedure)
MOV	Motor Operated Valve
MV	Manual Valve
NRC	Nuclear Regulatory Commission
NCO	Nuclear Control Operator
ONP	Off Normal Procedure
OOS	Out Of Service
PCP	Primary Coolant Pump
PCV	Pressure Control Valve
PWR	Pressurized Water Reactor
QO	Quarterly Operations (procedure)
SOP	System Operating procedure
SRO	Senior Reactor Operator
TM	Temporary Modification
TS	Technical Specification
URI	Unresolved Item
VIO	Violation