U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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Report No:	50-237/99016 (DRP); 50-249/99016(DRP)
Licensee:	Commonwealth Edison (ComEd) Company
Facility:	Dresden Nuclear Station Units 2 and 3
Location:	6500 North Dresden Road Morris, IL 60450
Dates:	August 13 through September 28, 1999
Inspectors:	K. Riemer, Senior Resident Inspector B. Dickson, Resident Inspector D. Roth, Resident Inspector R. Zuffa, IDNS Resident Engineer
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EXECUTIVE SUMMARY

Dresden Nuclear Station Units 2 and 3
NRC Inspection Report 50-237/99016(DRP); 50-249/99016(DRP)

This inspection included routine resident inspection from August 13 to September 28, 1999.

Operations

- The inspectors concluded that the general material condition of the units and of safety-related systems was acceptable. The inspectors also noted that plant housekeeping was good. (Section O2.1)

- The standby liquid control system and the low pressure coolant injection systems were in their correct alignments. The conditions of the systems were good. (Section O2.2)

- Technical Specification required surveillance tests were completed satisfactorily for safety-related systems, including the emergency diesel generators, standby gas treatment systems, and the high pressure coolant injection systems. The performance of the equipment met the acceptance criteria in the Technical Specifications. The inspectors identified no significant issues during direct observations of the surveillance tests. (Section O2.3)

- The operators performed well during routine operations. The operators also responded correctly to non-routine events, including a partial loss of condenser vacuum. (Section O4.1)

Maintenance

- Routine scheduled work was usually performed well. Communications between departments were good. Work activities, including first time activities, were performed correctly. (Section M1.1)

- Material condition was acceptable. However, the inspectors and Nuclear Oversight noted several examples where equipment issues involving the control rod drive system, the recirculation system and secondary containment continued to challenge the operators. (Section M2.1)

- The maintenance staff's failure to install the air-operated valve solenoids correctly for the containment cooling service water vault door drain valves caused both the Unit 2 and the Unit 3 containment cooling service water pumps in the vaults to be inoperable. Post-installation verification of these valves did not identify the error and multiple performances of the 18-month Technical Specification required surveillance tests did not identify the error. (Section M4.1)

- The 2B standby liquid control pump motor was successfully re-coupled and realigned with its pump counterpart within the Technical Specification time limit for the subsystem. Plant personnel followed the instructions in the work package and were knowledgeable of their responsibilities during the maintenance activity. (Section M4.2)

Engineering

- Equipment material condition issues identified by inspectors during routine walk downs, such as an unconnected ventilation damper actuator, damaged containment penetrations, and plugged flow meters, indicated a lack of attention to detail during routine licensee system walk downs. (Section E2.1)

- The inspectors identified orifice plates that were installed backwards in the recirculation pump seal purge system and in the atmospheric containment atmosphere dilution system. The plates were installed such that system flow was contrary to the labels on the plates' panhandles. For the particular systems, the licensee concluded that there was no safety impact. (Section E2.2)

- In general, engineering support was good. However, engineering provided operations incorrect information about the safety-related ventilation, resulting in operations unnecessarily declaring the auxiliary electric ventilation system inoperable; the information was subsequently corrected and the ventilation system declared operable. Engineering also provided changes to high pressure coolant injection system surveillance testing that caused operations to question the system's operability; subsequently the licensee determined that the high pressure coolant injection system remained operable. The licensee entered the issues into the corrective action program. (Section E4.1)

Plant Support

- The inspectors identified no deficiencies in radiation control. (Section R1.1)

Report Details

Summary of Plant Status

Unit 2 began this inspection period at approximately 80 percent power due to a partial loss of main condenser vacuum on August 12, 1999, caused by problems with the steam jet air ejectors. Vacuum and full power operation were reestablished on August 13, 1999. The unit remained near or at full power until September 26, 1999. On September 26, 1999, Unit 2 started coast down operations with all rods fully withdrawn from the core. Reactor power was approximately 97 percent at the end of the inspection period.

Unit 3 began this inspection period at full power. On August 28, 1999, power dropped approximately 30 MWe due to an unexpected scram of the E-5 control rod drive during a surveillance test. Full power was reestablished later that day, and the unit remained near full power throughout the remainder of the period.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. Specific events and noteworthy observations are detailed in the sections below.

During the inspection period one event occurred that required prompt notification of the NRC per 10 CFR 50.72. The event is listed below:

9/25/99	(Units 2, 3) Operation Outside Design Basis due to Ventilation Damper Within the Control Room Heating Ventilation and Air Conditioning Envelope Failing Open Instead of Closed. This event was retracted 9/27/99 following discovery that the vent indeed failed closed.

O2 Operational Status of Facilities and Equipment

O2.1 Routine System and Plant Walk Down (Units 2, 3)

a. Inspection Scope (71707)

The inspectors reviewed the status and availability of selected equipment through panel monitoring, system walk downs, and review of logs. The walk downs included areas that housed safety-related equipment.

b. Observations and Findings

Overall, the inspectors determined that equipment and material condition were acceptable. Components were generally free from leaks and corrosion and were in good condition. The plant housekeeping on both units was good, particularly considering the licensee was preparing and staging equipment for the upcoming Unit 2 refueling outage. The inspectors noted that most pathways were kept clear and staged equipment and tools were properly stowed away from operating equipment.

However, the inspectors noted several minor deficiencies in equipment and material. These are described further in Section E2.1 of this report.

c. Conclusion

The inspectors concluded that the general material condition of the plants and of safety-related systems was acceptable. The inspectors also noted that plant housekeeping was good.

O2.2 Engineered Safety Feature System Walk Downs (Units 2, 3)

a. Inspection Scope (71707)

During the inspection period, the inspectors used Inspection Procedure 71707 to walk down accessible portions of the Unit 2 standby liquid control system and the Unit 3 low pressure coolant injection system.

b. Observations and Findings

For the standby liquid control system, the inspectors verified that the equipment was in its standby valve alignment and electrical alignment. The inspectors verified that the standby liquid control system's heat tracing was operable and maintained pipe temperatures above minimum boron solution solubility limits. The inspectors noted that none of the valves in the standby liquid control system showed signs of excessive boron leakage.

For the low pressure coolant injection system, the inspectors also verified the system's valve alignment. The inspectors verified that all accessible valves were aligned in accordance with Dresden Operating Procedure (1500-01, "Low Pressure Coolant Injection Mechanical Lineup"). The system piping and valves were in good material condition.

c. Conclusions

The standby liquid control system and the low pressure coolant injection system were in their correct alignments. The conditions of the systems were good.

O2.3 Technical Specification Required Surveillance Tests

a. Inspection Scope (71707)

The inspectors observed and reviewed the results of a sampling of Technical Specifications required surveillance tests. The sample reviewed included the following tests:

DOS 2300-03, "Unit 2 High Pressure Coolant Injection System Operability Surveillance"
DOS 6600-02, "Unit 3 Diesel Generator Monthly Operability Surveillance"
DOS 6600-02, "Unit 2/3 Emergency Diesel Generator Monthly Operability Surveillance"
DOS 7500-01, "Unit 2 Standby Gas Treatment Monthly Surveillance"

As part of the review, the inspectors compared the tests with the Updated Final Safety Analysis Report and the Technical Specifications.

b. Observations and Findings

During review of the completed tests, the inspectors determined that the periodicity of the surveillance tests met the minimum periodicity stated in the Technical Specifications. The inspectors also confirmed that the surveillance acceptance criteria listed in the procedure for each surveillance met the intent of the Technical Specification requirements. The inspectors identified no problems with the completed tests.

Test instruments used were verified to be in the licensee calibration program and were currently calibrated.

The inspectors directly observed the performance of several tests. On August 13, 1999, the licensee performed the quarterly operability surveillance test for the Unit 2 high pressure coolant injection system. During this test, the high pressure coolant injection system developed and maintained the flow and pressure required by the Technical Specifications. The inspectors noted that the gland seal leak-off condenser drain pump adequately maintained condenser hotwell level within the normal bands during the duration of the evolution. Also, the inspectors noted no excessive steam or water leakage from the system during the surveillance test.

Both the Unit 3 and Unit 2/3 emergency diesel generators passed their surveillance tests. During field observations of the 2/3 diesel test, the inspectors noted that the fuel oil equalization line was not properly attached to the engine, and had become pinched improperly in its hold-down bracket, and the line showed signs of vibratory wear. The licensee subsequently corrected the line's bracket.

The inspectors observed portions of the unit two standby gas treatment system monthly surveillance. Again, the inspectors identified no concerns. The system developed the correct flow and filtration differential pressure.

After the completion of each surveillance test, the systems' alignments were returned to normal. Independent verification of system status was used correctly to verify the

restoration of the systems. The inspectors verified repositioned locked valves to be in their proper position.

c. Conclusion

Technical Specifications required surveillance tests were completed satisfactorily for safety-related systems, including the emergency diesel generators, standby gas treatment systems, and the high pressure coolant injection systems. The performance of the equipment met the acceptance criteria in the Technical Specifications. The inspectors identified no significant issues during direct observations of the surveillance tests.

O4 Operator Knowledge and Performance

O4.1 Operators' Performance

a. Inspection Scope (71707)

The inspectors evaluated the operators' performance during both planned and emergent plant conditions.

b. Observations and Findings

ROUTINE OPERATIONS

Control room operations were generally good. The inspectors noted that the operators used appropriate peer checks and communications. The operators appropriately used and followed procedures. Pre-evolution briefs observed were good, and included discussions of Technical Specifications, past lessons learned, and contingency plans.

In Inspection Reports 98019 and 98021, the inspectors documented several issues regarding operators' recognition of, and compliance with, Technical Specifications. In contrast to the issues identified last year, no issues regarding missed Technical Specifications occurred this period. The operators were knowledgeable of the appropriate Technical Specifications and Limiting Conditions for Operation for the plants' conditions.

The inspectors also observed operators perform reactivity changes such as control rod swaps and recirculation flow adjustment Technical Specifications. The inspectors noted good operator performance.

EMERGENT OPERATIONS

On August 12, 1999, the Unit 2 operators had to perform an emergency load drop to 645 MWe due to a stalled steam jet air ejector. This stalled steam jet air ejector caused a significant loss of main condenser vacuum. Control room indications showed that condenser vacuum dropped to 25.1 inches of mercury. If the decrease would have continued to 24.8 inches of mercury, the plant's procedures would have required the

operators to insert a manual scram. The inspectors reviewed the control room logs and interviewed the operators, and concluded that the operators responded appropriately to this event. The operators correctly used abnormal operating procedures and completed the annunciator procedure steps of entering the heater bay and opening the steam jet air ejector condenser loop seal level control valve bypass valve.

Two minor fires occurred during this period. The first fire occurred on August 16, 1999, in the Unit 3 condensate demineralizer panel. The second occurred on August 24, 1999, in the Unit 1 crib house. The licensee extinguished both fires within ten minutes of initial notification. On both occasions, the operators entered the correct abnormal operating procedure. There was one performance issue noted by the inspectors while observing the operators' response to the first fire. A very brief break down in communication between a fire-responder and the control room occurred when one operator initially tried to communicate on the wrong radio channel. The licensee captured this issue as a lessons-learned during a self-assessment meeting immediately following the first fire. Communication issues did not resurface during the second fire.

A control rod unexpectedly scrammed into the reactor in this period due to a significant air leak on the hydraulic control unit's outlet scram valve (see Section M2.1 for more details). This event occurred during the performance of Dresden Operating Surveillance (500-08) "Main Steam Isolation Valve Scram Functional Test." This event resulted in an approximate thirty megawatt decrease in electric output. According to the control room logs, the operator entered the correct abnormal operating procedure (300-01, "Reactivity Management") and made the appropriate notification required by the procedures.

c. Conclusions

The operators performed well during routine operations. The operators also responded correctly to non-routine events, including a partial loss of condenser vacuum.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensee Event Report 50-237/97015-00: Operations Fails to Enter Drywell Radiation Monitor Limiting Condition for Operation (LCO) Due to Inadequate Pre-job Surveillance Review. The Licensee Event Report (LER) documented the event on August 21, 1997, when operations staff identified the need to enter Technical Specifications 3.2.F., Accident Monitoring, but failed to identify that Technical Specifications 3.2.A., Isolation Actuation, would need to be entered concurrently, for performance of Dresden Instrument Surveillance 1600-16, Drywell High Radiation Monitor Group 2 Isolation Functional and Calibration Tests.

The NRC already discussed this event in Inspection Report 97013, in which the inspectors concluded that the licensee's failure to take corrective actions sufficient to preclude repetition of a missed Technical Specification limiting condition for operation entry was a violation of 10 CFR Part 50, Appendix, Criterion XVI, "Corrective Action" (VIOLATION 50-237/ 97013-01B(DRP); 50-249/97013-01B(DRP)). The violation was

closed in Report 99006. Review of the LER revealed no new information. Therefore, this LER is closed.

O8.2 (Closed) Licensee Event Report 50-237/97010-00: Feedwater Transient Results in Manual Reactor Scram due to Operating Team Knowledge Weakness and Operator Weakness While Performing Manual Level Control. The LER discussed the event of July 28, 1997, when performance of a reactor feedwater pump swap caused a higher-than-expected reactor pressure vessel level increase and resulted in the operator taking manual control of feedwater. The operator failed to control feedwater adequately, and ultimately the unit supervisor ordered a trip of the reactor. The NRC documented review of this issue in Inspection Report 97016. Review of the LER revealed no new information. Therefore, this LER is closed.

O8.3 (Closed) Inspection Follow-up Item (50-237/97013-03(DRP); 50-249/97013-03(DRP)): The Bases for the Temperature Limits for the Hydrogen Analyzers and the Impact on Equipment Operability and the use of Space Heaters. The off-gas hydrogen analyzer operation and maintenance manual listed the ambient temperatures for the hydrogen analyzer as a nominal 50°F to 105°F, with a maximum of 140°F for 8 hours. By contrast, the Appendix F operator rounds listed 50°F to 110°F as the acceptable temperature. On August 8, 1997, the inspectors, and independently the operators, observed that the temperatures near the Unit 2 and Unit 3 hydrogen analyzers were above the listed nominal values. Space heaters had been turned on, and were heating the area. Furthermore, the rounds sheets listed values higher than the vendor's manual suggested.

The licensee responded to this inspection follow-up item in its Reply to a Notice of Violation for violations transmitted in Inspection Report 97013 (ref. JSPLTR: 97-0195, dated November 21, 1997). The licensee was not required to reply to the follow-up item, but choose to do so. The licensee documented how the issues (related to frequency of rounds and temperature listed in the rounds for the hydrogen analyzers) had been addressed. This item is closed.

O8.4 (Closed) Licensee Event Report 249/97011-00: Standby Liquid Control Was Inoperable From Suction Line Low Temperature Due to a Wiring Discrepancy in the Heat Trace Controller Circuit. This LER documented a problem discovered in October of 1997, with incorrect controls on the heat trace system for the Unit 3 standby liquid control system. This issue was discussed initially in Inspection Report 97024. Inspection Report 97024 stated, "When faced with conflicting indications between the alarm and the local reading, licensee personnel relied on the less conservative of the two indications and did not declare the standby liquid control system inoperable. The licensee operated the plant for more than 34 hours without an operable standby liquid control system, well beyond the allowable 8 hours. Lack of knowledge of the exact locations of the temperature sensor and switch contributed to this decision. A violation was issued for failing to comply with Technical Specifications."

Report 97024 also documented initial review of the LER, and noted that the LER discussed the correcting actions and the event causes, but did not discuss the operators' failure to believe the valid annunciator. However, the licensee subsequently addressed the issues of conservative decision making with the operators and

documented this in the response to violation 249/97024-01 (ref: letter dated January 26, 1998, from Site Vice President to USNRC, JMHLTR: #98-0011). No additional issues were identified during the inspectors' review of the LER. This item is closed.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Maintenance

a. Inspection Scope (62707, 61726)

The inspectors reviewed the planning and performance of work on major equipment. The reviews included direct observation of work and monitoring of post-work critiques and investigations.

b. Observations and Findings

The inspectors determined that the workers and managers assigned to the major tasks were knowledgeable and performing well. Daily meetings between the shift manager, work week manager, and other first-line level supervisory staff showed good communications and awareness of the maintenance issues. The meetings addressed the risk significance of issues, the status of the work, and the expected completion dates.

During field observations of maintenance personnel, the inspectors verified that the maintenance personnel were correctly using the current procedures and work packages. The inspectors also verified that the test instruments were in the licensee calibration program and were currently calibrated.

Routinely scheduled work generally was completed within the scheduled time, and the equipment was returned to service and made operable as planned. Most often, the communication and coordination between maintenance staff and operation staff were good. The inspectors noted this was especially true during the completion of more involved maintenance. The licensee successfully did several first-time online maintenance activities on Unit 2 (the licensee had previously performed the maintenance during outages). Some of these evolutions included low pressure coolant injection system logic testing and core spray system logic testing.

c. Conclusions

Routine scheduled work was usually performed well. Communications between departments were good. Work activities, including first time activities, were performed correctly.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Material Condition Observations

a. Inspection Scope (62707)

The inspectors assessed the plant's material condition by noting the availability of equipment, and the frequency and impact of self-revealing equipment failures during the inspection period.

b. Observations and Findings

Typically, safety-related plant equipment such as the high pressure coolant injection systems, the emergency diesel generators, and the containment cooling service water pumps worked when called upon. However, the operations staff continued to be challenged by some material condition-related issues. Some issues caused safety-related equipment to be inoperable. The examples noted are listed below:

Control Drive System

On August 28, 1999, control rod drive E-5 scrammed into the reactor during an operability surveillance. Initial investigation by the licensee determined that a faulty scram pilot solenoid valve caused the control rod to scram when given only a half-scram signal.

However, further investigations by the system engineer determined that the cause of the unexpected scram of the control rod drive was a significant air leak on the hydraulic control unit's outlet scram valve. The system engineer proposed that an incorrect maintenance practice caused this air leak on this air-operated valve. Upon examining the air-operator valve diaphragm after the licensee took it out of service, the system engineer discovered a grease-like residue around the outer flange area of the diaphragm. This outer flange area of the diaphragm contains bolt holes to allow flange bolts to pass through during assembly of the air-operated valve. Normally, when the licensee tightened the flange bolts, the bolts created friction between the mating surface area of the diaphragm at the flange of the valve; this friction between the two surfaces created a leak-tight boundary. With grease added around the peripheral edge of the diaphragm where the flange bolts were, the grease significantly reduced the friction. The reduced friction at the flange allowed some movement of the diaphragm material around the valve flange that may have resulted in elongation or tearing of the diaphragm at the bolt holes.

To investigate this incident further, the licensee has sent the diaphragm to a testing facility; test results were not available at the conclusion of this inspection period.

The inspectors were concerned about this issue following a walk down of the control rod drive hydraulic control units and noting grease-like residues around the air-operated valve flange on several scram inlet and scram outlet valves. Also, the inspectors previously identified (and turned over to the licensee) evidence of a grease-like residue

around the flange of HPCI air-operated valves. The inspectors have classified this issue as an inspection follow-up item **(IFI 50-237/249; 99016-01)** to track additional review.

Seals on the Reactor Recirculation Pumps

Over the last three inspection periods, three of the four reactor recirculation pumps have experienced temperature and pressure anomalies through their mechanical seals. On Unit 2, the 2B reactor recirculation pump seals have experienced these anomalies, and, on Unit 3, both the 3A and the 3B reactor recirculation pump seals have experienced these anomalies.

These anomalies included variations in the #2 seal's pressure, accompanied by a rise in seal cooling water outlet temperature. Normal operating ranges for the temperature and pressure for the reactor recirculation pump seals are approximately 134°F to 140°F and 495 psig to 500 psig, respectively. During the instances when the anomalies occurred, the seal outlet temperature has risen by 50°F to 190°F, and the number two seal pressure has dropped by 50 psig to 450 psig. Following the perturbations in temperature and pressure, the seal's cooling water temperature settled out at a higher temperature. For example, in early August of 1999, the baseline temperature for the cooling water outlet for the "A" reactor recirculation pump was approximately 132°F, on September 3, 1999, the baseline temperature had reached approximately 154°F.

In Dresden's Engineering Operational Problem Response/Troubleshooting Plan, 99-3-02-348 and 349, the licensee discussed possible causes for these anomalies. In this document, the licensee suggested that one cause could be an adverse deflection of the seal faces, causing them to rub together. The seals are two-stage seals. The manufacturer designed these two stages such that the two faces of the seal have a thin film of water separating the two faces. Cooling water flows through the seal chambers and seal faces. With the possible rubbing of the seal faces, flow through the faces chokes off, thus causing temperature to rise, and pressure to go down. Damage to the seals could occur if this rubbing condition continued. The inspectors have confirmed that the operators are well aware of this issue and are continuously trending and monitoring seal conditions. The inspectors also noted that operations and engineering have developed a contingencies plan regarding failure of one or both of the mechanical seals in any reactor recirculation pump.

Another issue noted during this inspection period occurred on September 13, 1999, when the 2A reactor recirculation pump lower bearing low oil level alarm annunciated in the main control room. There is a known oil leak on the pump motor, and this motor is to be replaced during the upcoming refueling outage. On June 20, 1999, operators performed a load drop to ~200 MWe to perform a drywell entry to add oil to the motor. Based on the short time it took the alarm to recur, the licensee determined that the oil leakage rate had increased.

Secondary Containment Integrity

The licensee's Nuclear Oversight department, in problem identification form D1999-03644, reported a negative trend of unplanned Technical Specifications limiting condition for operating entries due to secondary containment interlock doors failing or the interlock being defeated. The problem identification form chronicled eight limiting condition for operation entries in 1999 due to secondary containment interlock door problems. These failures represented an additional challenge to operations.

The inspectors had previously identified a secondary containment penetration in the 2/3 emergency diesel generator room that was degraded.

c. Conclusions

Material condition was acceptable. However, the inspectors and Nuclear Oversight noted several examples where equipment issues involving the control rod drive system, the recirculation system, and secondary containment continued to challenge the operators.

M4 Maintenance Staff Knowledge and Performance

M4.1 Containment Cooling Service Water Pump Room Vault Door Drain Valve

a. Inspection Scope (62707)

The inspectors reviewed the results of the licensee's investigation into a September 20, 1999, event when the Technical Specifications-required Unit 2 containment cooling service water vault door drain valve failed its operability surveillance. The inspectors also walked down part of the surveillance test procedure.

b. Observations and Findings

During the performance of Dresden Operating Surveillance 4400-01, "Containment Cooling Service Water Vault Floor Drain," air-operated valve 2-4999-74 failed to close when testing actuated its high level switch. Due to the failure of this valve to close, the operators declared the Unit 2 containment cooling service water system inoperable and entered a 7-day Technical Specifications 3.8.A, limiting condition of operation.

The licensee's preliminary investigation into this issue found that maintenance staff installed the three-way solenoid valve for this air-operated valve backwards. With the valve solenoid installed backwards, de-energizing the solenoid would result in bottling up the air supply between the solenoid and the valve actuator, therefore not failing closed for loss of power as designed.

The licensee next discovered that they also installed the solenoid for the same air-operated valve on Unit 3 backwards. After this discovery, Unit 3 was placed in the same 7-day limiting condition for operation.

Maintenance history showed that the licensee newly installed the Unit 2 solenoid valve on March 11, 1998, under Work Request 960105706 as part of a 6-year preventive maintenance. The work history showed no failures of the valve during the post maintenance verification run or a follow-on 18-month operability run. The maintenance history for Unit 3's solenoid valve showed that the licensee newly installed the valve on February 28, 1994, also as part of a six-year preventive maintenance, and again they did not identify the installation error during post-maintenance verification. The performance of two additional operability surveillance tests also failed to uncover the installation error.

Following the investigation into this issue, the licensee replaced the two solenoid valves using the correct orientations. The licensee retested the valves and determined that the valves were operating correctly. The licensee exited both units' limiting condition for operations.

The inspectors were concerned about this event because multiple post maintenance verification tests and Technical Specification required operability surveillance tests failed to identify this issue. Therefore, pending further investigation of this issue, the inspectors classified this issue as an unresolved item **(URI 50-237/249; 99016-02)**.

c. Conclusions

The maintenance staff's failure to install the air-operated valve solenoids correctly for the containment cooling service water vault door drain valves, caused both the Unit 2 and the Unit 3 containment cooling service water pumps in the vaults to be inoperable. The inspectors were concerned because post-installation verification of these valves did not identify the error, and multiple performances of the 18-month Technical Specification required surveillance tests did not identify the error.

M4.2 Standby Liquid Control Pump Maintenance

a. Inspection Scope (62707)

The inspectors observed and evaluated maintenance performance on the 2B standby liquid control pump and motor. The inspectors also reviewed the work package for the work in progress. (Work Request 980097076-01)

b. Observations and Findings

The purpose of the work was to lubricate and replace the pump to the motor coupling and to do a realignment between the pump and motor.

The inspectors noted that the work package was at the work site and was being used by the maintenance workers. The workers were knowledgeable in the tasks being performed and were using good safety practices. The Maintenance Supervisor was at the work site monitoring the progress of the tasks.

The inspectors discussed the details of the work scope with the Maintenance Supervisor and with the workers doing the physical work tasks as outlined within the work package.

c. Conclusions

The 2B standby liquid control pump motor was successfully re-coupled and realigned with its pump counterpart within the Technical Specification time limit for the subsystem. Plant personnel followed the instructions in the work package and were knowledgeable of their responsibilities during the maintenance activity.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Problem Identification During Routine Walk downs

a. Inspection Scope 37551

The inspectors assessed material condition of equipment during routine plant walk downs.

b. Observations and Findings

Overall, the equipment and plant were in good material condition. Most equipment was free from leaks or evidence of equipment problems. The licensee already entered most deficiencies that did exist into the licensee's corrective action process and had an "Action Request" tag hanging near the deficiency.

However, during this period, the inspectors identified several issues related to plant and equipment material condition. Most of these were readily apparent and should have been identified by the licensee during routine system walk downs performed by engineering and operations. The inspectors reported the issues to the licensee and the licensee entered the issues into the corrective actions process via problem identification forms D1999-03649, D1999-03735, D1999-03542, D1999-03668 and D1999-03666. In some instances, items were not placed into the licensee corrective action process (via a "Problem Identification Form" or an "Action Request") until the inspectors highlighted the item. Items identified by the inspectors included the following deficiencies:

- Reactor Well Drain Volumetric Flow Switches 2(3)FS-1901-107 appeared to have their flow meters plugged with debris.

- The Reactor Building Unit 2 Exhaust Isolation Damper Accumulator AO2-5741A had its instrument air supply tubing clamp from an accumulator completely loose. Plant Drawing M-269 showed accumulator and tubing assembly as Safety-Related. Similarly, Reactor Building Unit 2 Exhaust Isolation Damper Accumulator AO2-5742B also had an instrument air clamp loose.

- The licensee installed the flow orifice backwards on the Unit 3 Atmospheric Containment Dilution system B. More details regarding this issue are in Section E2.2 below.

- The mounting bolt on Unit 3 turbine building exhaust air damper's actuator 3-5772-52B was loose; one bolt was completely gone.

- The 2/3 diesel generator's fuel oil equalization line was pinched between the clamp of the hold-down bracket and the engine support. The line showed signs of wear.

- A secondary containment penetration between the unit 2/3 emergency diesel generator room and the Unit 2 high pressure coolant injection room had a visible crack. The licensee confirmed the inspector's observation by using a smoke test that showed that the penetration leaked. However, the licensee concluded that secondary containment remained operable. The licensee's fire hazard analysis documented that this penetration was not a fire barrier.

The above issues identified by the inspectors were all found during non-intrusive walk downs. The inspectors believed that routine walk downs performed by engineering and operations staff should have identified these issues.

c. Conclusions

Equipment material condition issues identified by inspectors during routine walk downs, such as an unconnected ventilation damper actuator, damaged containment penetrations, and plugged flow meters, indicated a lack of attention to detail during routine licensee system walk downs.

E2.2 System Flow Orifices and Restrictors

a. Inspection Scope (62707)

The inspectors assessed the licensee's response to issues related to flow orifices and restricting orifices that were installed backwards.

b. Observations and Findings

On September 3, 1999, during a routine walk down of the plant, the inspectors discovered that the licensee had installed the flow measuring orifice for the Unit 3B atmospheric containment atmosphere dilution system backwards. The inspectors notified the Unit 3 supervisor of the findings.

The system engineer confirmed that the flow orifice, which provides a control signal to a downstream flow control valve and provides post-accident atmospheric containment atmosphere dilution system vent line flow indications in the control room, was installed backwards. However, the system engineer and operators concluded that there were no operability issues with the flow orifices because the licensee abandoned this equipment,

and that there were no procedures for using the system. The licensee documented the issue in problem identification form D1999-03492.

During this control room inspection, the inspectors found that although the licensee indeed abandoned some functions of the atmospheric containment atmosphere dilution system, other functions of the equipment remained fully energized and operable (the containment purge was disabled, but containment bleed path was still functional). The inspectors also found that Dresden Operating Procedure 2500-02, "ACAD Pressure Bleed Subsystem Operation, Revision 07, was still in the control room, and was a valid operating procedure.

However, the inspectors found no general procedure, emergency operating procedure, or abnormal procedure that directed entry into the atmospheric containment atmosphere dilution procedure. The atmospheric containment atmosphere dilution procedure itself was to be used only if so directed by the unit supervisor, but nothing ever told the unit supervisor to provide this direction to the crew. Therefore, the impact of the backward orifice was minimal.

The inspectors had identified a similar issue in another system during the previous period. The licensee installed restricting orifices backwards on the 2A and 3B reactor recirculation pump seal purge system's seal purge flow controller. The station's response to this configuration was that it did not affect the operation of the reactor recirculation pump seal purge flow controller.

Although neither system seemed to be impacted by the backward installation, the NRC was still concerned that the system engineers had not identified and resolved the issues prior to the inspectors. Also, the inspectors questioned the licensee regarding whether reversed orifices was a global plant configuration issue. The licensee had not considered the potential generic aspects of these findings. The licensee documented the concern in problem identification form D1999-03706, and assigned resolution to engineering with a due date of December 15, 1999.

c. Conclusions

The inspectors identified orifice plates that were installed backwards in the recirculation pump seal purge system and in the atmospheric containment atmosphere dilution system. The plates were installed such that system flow was contrary to the labels on the plates' panhandles. For the particular systems, the licensee concluded that there was no safety impact.

E4 Engineering Staff Knowledge and Performance

E4.1 General Engineering Support (37551)

In general, support to operations staff appeared good. However, two issues were identified concerning providing accurate and timely data to operations.

First, engineering staff inaccurately concluded that the plant was operating outside the design basis because the engineering staff believed that a damper in the safety-related auxiliary electric equipment room would fail in the open position, instead of failing in the closed position. This was the retracted Emergency Notification System call mentioned in Section O1.1 of this report. The problem was that engineering staff had incorrectly read prints while appropriately reviewing industry experience for applicability at Dresden. The licensee captured the issue in problem identification forms D1999-03817 and D1999-03820.

Second, engineering staff provided a change in criteria for a surveillance test on the high pressure coolant injection system, but did not review the previous performances to see any impact. Because of the lack of a timely review of past performances, operations questioned if high pressure coolant injection was operable because the last surveillance did not appear to meet the new acceptance criteria. Operations ordered an operability determination to be done on the high pressure coolant injection system (the system was determined to be operable). Although there were no significant consequences to this issue, the licensee captured the issue in problem identification form D1999-03869 to improve future performance.

Engineering provided operations incorrect information about the safety-related ventilation, resulting in operations unnecessarily declaring the auxiliary electric ventilation system inoperable; the information was subsequently corrected and the ventilation system declared operable. Engineering also provided changes to high pressure coolant injection system surveillance testing that caused operations to question the system's operability; subsequently, the licensee determined that the high pressure coolant injection system remained operable. The licensee entered the issues into the corrective actions program to improve future performance.

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Licensee Event Report 50-249/97004-01: Isolation Condenser Spurious Group V Isolation Due to Steam Flash in Condensate Return Line Due to Design Deficiency. This Licensee Event Report described the event of March 29, 1997, when a spurious primary containment Group V isolation occurred after operations personnel performed a valve lineup in accordance with Dresden General Procedure 02-03, "Reactor Scram", to secure the Isolation condenser from standby and before placing the shutdown cooling system in service. The operations staff was shutting down Unit 3 for a refueling outage. The outboard isolation condenser reactor inlet isolation valve (MO 3-1301-3) went closed from the open position as designed, and all other isolation valves had already been closed in accordance with procedures. The LER stated that cause of the spurious Group V isolation was a design deficiency in the Group V isolation flow instrumentation.

The operators could not reset the Group V isolation signal because of a relay failure. The licensee analyzed the failed relay, and concluded that the failure was an isolated incident. The inspectors needed no additional information. This item is closed.

E8.2 (Closed) Licensee Event Report 50-249/97012-00: Reactor Recirculation B Loop, High Pressure Flow Element Venturi Instrument Line Steam Leakage Results in Unit 3 Shutdown Due to Fatigue Failure of Socket Welded Pipe Joint. This LER documented the discovery on November 1, 1997, that a steam leak existed on a socket weld at a one-inch tee fitting in the high pressure instrument line for the reactor recirculation pump loop B venturi flow element. The licensee promptly performed a Unit 3 shutdown in accordance with the pre-approved inspection plan, as required by Technical Specifications 3.6.H for primary pressure boundary leakage. Corrective actions included weld replacement.

This tee weld location failed again in March 1999, as documented in LER 50-249/99003. No detailed material analysis was done after the first failure, but in LER 50-249/99003, the licensee committed to perform a root cause investigation to learn the reasons the corrective actions started, after the November 1997 weld failure, were deficient. Additional review will be tracked under LER 50-249/99003 (discussed in Section E8.3 below). Therefore, LER 50-249/97012-00 is closed.

E8.3 (Closed) Licensee Event Report 50-249/99003-00: Reactor Recirculation B Loop, High Pressure Flow Element Venturi Instrument Line Steam Leakage Results in Unit 3 Shutdown Due to Fatigue Failure of Socket Welded Pipe Joint. This LER documented the second failure of the same reactor pressure boundary line (see Section E8.2 above for discussion of first failure). On March 21, 1999, during an inspection of the drywell for the source of a previously detected increase in unidentified leakage, the licensee identified a leak in the reactor pressure boundary. A steam leak was discovered on a socket weld at a one-inch tee fitting on the high pressure instrument line for the Reactor recirculation pump loop B venturi flow element. Unit 3 was then shut down, as required by Technical Specifications 3.6.H, for primary pressure boundary leakage.

The LER documented that preliminary analysis of the failure attributed it to fatigue cracking initiated from defects due to lack of weld fusion in the root of the socket weld. The licensee committed to transmit the details of the analysis in a supplement to this LER (see Section E8.4 below). The licensee also committed to perform a root cause investigation to learn why corrective actions done after the first failure in November 1997 were deficient. This LER is closed.

E8.4 (Closed) Licensee Event Report 50-249/99003-01: Reactor Recirculation B Loop, High Pressure Flow Element Venturi Instrument Line Steam Leakage Results in Unit 3 Shutdown Due to Fatigue Failure of Socket Welded Pipe Joint. The licensee submitted this supplement on September 1, 1999, to transmit the results of its failure analysis and the investigation into its root cause for inadequate corrective actions.

The licensee concluded that the failure of the weld was caused by fatigue crack propagation resulting from low amplitude, high cycle vibration accelerated by the presence of a lack-of-fusion root weld defect. The licensee found industry reports that discussed this issue as well.

The LER discussed the root cause for the second failure of the weld. The LER concluded that personnel error was the cause. Specifically, performance in engineering was inadequate, and engineering personnel failed to assure that available information

was reviewed, and that the previously implemented corrective actions were reviewed. Therefore, the weld repair in November of 1997, was not adequate because the licensee did not follow available information. However, the LER stated that the 1997 repair was in accordance with standard ASME codes. The new weld was installed per the recommendations of EPRI TR-107455, Vibration Fatigue of Small Bore Socket-Welded Pipe Joints, which recommended a more-robust weld.

E8.5 (Closed) Licensee Event Report 249/95022-00: Control Rod Drive Scram Discharge Volume Galleries Do Not Meet UFSAR Allowables Due to a Design Deficiency. This LER documented the discovery on November 17, 1995, that the Unit 3 East and West Bank control rod drive scram discharge volume gallery platforms did not meet the design allowable stresses specified in the UFSAR. The licensee found that they did not install some horizontal bracing members in accordance with the plant drawings. An operability evaluation determined that sufficient margin existed in the control rod drive scram discharge volume gallery steel to maintain operability.

The root cause of this event was a design configuration and analysis deficiency in the procedures and controls in place at the time of original plant construction. The LER also identified a missed opportunity to identify the error when the galleries were modified in the early 1980s. Corrective actions included re-analyzing the steel to remove unnecessary conservatism and adding required reinforcement to return stresses in the Unit 3 control drive scram discharge volume galleries to within UFSAR limits.

The NRC previously discussed this issue, in Section 3.1 of Report 95015, and assigned inspection follow-up item 95105-03 to track completion of the modifications to the gallery steel. As documented in Section E8.4 of Report 98024, the licensee completed the modifications in December of 1996. The NRC has also previously discussed the issue of the as-built condition of the plant not matching the UFSAR in various inspection reports (most notably, Independent Safety Inspection Report 96201). Review of LER 249/95022 revealed no new issues. This item is closed.

E8.6 (Closed) Licensee Event Report 50-237/97017-00: Potential Vortex Formation in the Condensate Storage Tank to High Pressure Coolant Injection Suction Nozzle Due to Original Design Error. This LER documented the discovery on November 26, 1997, that the high pressure coolant injection system could entrain significant amounts of air into the high pressure coolant injection suction piping before the water level would reach the condensate storage tank low-low level and initiate automatic transfer. Based on alignment of both condensate storage tanks (instead of just one, as had previously been the practice) to the high pressure coolant injection systems, and administratively maintaining water level in the condensate storage tanks and torus above low-level alarm limits, it was determined that there was no line break accident scenario where the low-low condensate storage tanks level switches would be needed to initiate a transfer of the high pressure coolant injection pump suction.

The LER cited inadequate original design as the cause of the event. The effects of vortexing upon the high pressure coolant injection system as aligned to the condensate storage tank were never considered within the original system design assumptions. The inspectors verified that the licensee maintained the high pressure coolant injection systems aligned to both condensate storage tanks. This LER is closed.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 General Comments (71750)

During routine inspections in radiologically controlled areas, the inspectors assessed licensee performance. Overall, the licensee's radiation protection staff enforced the plant's radiological control standards. The inspectors identified no deficiencies in radiation control.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management on September 28, 1999, following the conclusion of the inspection period. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. The licensee identified no proprietary information.

PARTIAL LIST OF PERSONS CONTACTED

Licensee

D. Ambler, Regulatory Assurance Manager
P. Boyle, Chemistry Manager
P. Chabot, Site Engineering Manager
R. Fisher, Operations Manager
B. Hansen, Shift Operation Supervisor
L. Jordan, Learning Services Training Supervisor
R. Kelly, Regulatory Assurance NRC Coordinator
J. Moser, Radiation Protection Manager
M. Pacilio, Work Control Manager
P. Planning, Unit 1 Plant Manager
B. Rybak, Licensing Engineer
J. Sipek, Director of Licensing and Compliance
J. Stone, Nuclear Oversight Manager
P. Swafford, Station Manager
T. Yarbrough, Human Performance Manager

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92901:	Followup - Plant Operations
IP 92903:	Followup - Engineering

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-237;249/99016-01	IFI	Maintenance practice of adding grease around flange of air-operated valves
50-237;249/99016-02	URI	Post maintenance testing 3-way solenoid valve for containment cooling service water vault door drain valve

Closed

50-237/97015-00	LER	Operations fails to enter drywell radiation monitor limiting condition for operation (LCO) due to inadequate pre-job surveillance review
50-237/97010-00	LER	Feedwater transient results in manual reactor scram due to operating team knowledge weakness and operator weakness while performing manual level control
50-237;249/97013-03	IFI	The bases for the temperature limits for the hydrogen analyzers and the impact on equipment operability and the use of space heaters
50-249/97011-00:	LER	SBLC was inoperable from suction line low temperature due to a wiring discrepancy in the heat trace controller circuit
50-249/97004-01	LER	Isolation condenser spurious Group V isolation due to steam flash in condensate return line due to design deficiency
50-249/97012-00:	LER	Reactor recirculation B loop, high pressure flow element venturi instrument line steam leakage results in Unit 3 shutdown due to fatigue failure of socket welded pipe joint

50-249/99003-00	LER	Reactor recirculation B loop, high pressure flow element venturi instrument line steam leakage results in Unit 3 shutdown due to fatigue failure of socket welded pipe joint
50-249/99003-01:	LER	Reactor recirculation B loop, high pressure flow element venturi instrument line steam leakage results in Unit 3 shutdown due to fatigue failure of socket welded pipe joint
50-249/95022-00	LER	CRD scram discharge volume galleries do not meet UFSAR allowables due to a design deficiency
50-237/97017-00	LER	Potential vortex formation in the CST to high pressure coolant injection suction nozzle due to original design error

Discussed

None

LIST OF ACRONYMS USED

IFI	Inspection Followup Item
LER	Licensee Event Report
MWe	Megawatt Electric
psig	Pounds Square Inch Gage
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item