

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-295/91002(DRP); 50-304/91002(DRP)

Docket Nos. 50-295; 50-304

Licenses No. DPR-39; DPR-48

Licensee: Commonwealth Edison Company
Opus West III
1406 Opus Place - Suite 300
Downers Grove, IL 60515

Facility Name: Zion Nuclear Power Station, Units 1 and 2

Inspection At: Zion, Illinois

Inspection Conducted: January 15, 1991 through February 22, 1991

Inspectors: M. J. Farber


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3/20/91
Date

Inspection Summary

Inspection from January 15 through February 22, 1991 (Reports No. 50-295/91002(DRP); No. 50-304/91002(DRP))

Areas Inspected: Routine, unannounced resident inspection of licensee action on previous inspection findings; summary of operations; operational safety verification and engineered safety feature (ESF) system walkdown; surveillance observation; maintenance observation; safety assessment and quality verification; licensee event reports (LERs); and training.

Results: Of the 11 areas inspected, one violation was identified in one area. An inspector identified violation was the licensee's failure to follow procedures on the return of the 0 Emergency Diesel Generator (EDG) to service and the termination of the Unusual Event (UE) associated with this event, see Paragraph 4 of this report. No violations or deviations were identified in the remaining 10 areas.

Operations

The licensee's premature operability call of the 0 EDG and the termination of the UE prior to satisfactory completion of the performance test violated their Surveillance and Degraded Equipment procedures. This occurred due to a breakdown in communications between senior plant management and the shift engineer. Another example of a communications problem existed when a shift engineer failed to communicate to the nuclear station operator that a functional test and not a surveillance test was being performed on a containment spray pump. Although there was minimal safety significance for both instances, it is apparent that improvements are needed in the area of communications.

Surveillance

During the Unit 1 forced outage, the licensee completed refueling snubber surveillance testing. The control room HVAC ventilation testing was also performed to meet a licensing commitment to demonstrate that General Design Criteria 19 requirements are met. The results of this test will be completed in approximately one month. The Technical Staff provided good support for the above testing activities.

Maintenance

The licensee repaired the number one and two component cooling heat exchangers (CCHXs) during the Unit 1 outage. The number one CCHX was repaired in June 1990 but developed leaks which required it to be reworked.

The control room ventilation coolers were in a degraded condition for an extended period due to no prioritization system for parts evaluations.

There were numerous EDG problems during this inspection period. Many of the problems were the result of a historical lack of preventative maintenance. The licensee has implemented EDG walkdowns and maintenance outages in an attempt to improve the reliability of all the EDGs.

Engineering/Technical Support

During penetration walkdowns by the technical staff, discrepancies were found in the as-built drawings for an abandoned in-place penetration plug and for the penetration pressurization air zone supply to the penetration. The identified deficiencies were the result of a testing program. The technical staff continues to provide good support to all departments.

Safety Assessment/Quality Verification

The licensee declared a UE following the discovery of two containment penetrations that had not been type B or C leak rate tested for either unit during a technical staff system walkdown. A timely Temporary Waiver of Compliance and an Emergency Technical Specification change request were submitted to prevent a Unit 2 shutdown and to extend the testing requirement time. A Safety Evaluation for degraded control room ventilation coolers was timely and thorough. The licensee's actions in response to the Quad Cities

motor operated valve (MOV) stroking practices that resulted in loss of coolant accident were thorough. The Operations staff was promptly notified by memo of the event and of what precautions to take. The maintenance department did an extensive procedure review and made necessary revisions to reduce the probability of a loss of coolant accident while stroking MOVs.

DETAILS

1. Persons Contacted

- *T. Joyce, Location Manager
- T. Rieck, Superintendent, Technical
- *W. Kurth, Superintendent, Production
- R. Budowle, Onsite Nuclear Safety
- *T. Broccolo, Director, Services
- *D. Karjala, Director, Performance Improvement
- *W. Stone, Assistant to Technical Superintendent
- D. Redden, Assistant to Production Superintendent
- *P. LeBlond, Assistant Superintendent, Operations
- R. Johnson, Assistant Superintendent, Maintenance
- J. LaFontaine, Assistant Superintendent, Work Planning
- *J. Wozniak, Project Manager, ENC
- D. Bump, Nuclear Quality Programs, Superintendent
- *C. Schultz, Quality Control Supervisor
- *R. Chrzanowski, Regulatory Assurance Supervisor
- W. T'Niemi, Technical Staff Supervisor
- R. Milne, Security Administrator
- T. Sakscinski, Regulatory Assurance
- N. Valos, Unit 2 Operating Engineer
- W. Demo, Unit 1 Operating Engineer
- M. Carnahan, Unit 0 Operating Engineer
- W. Mammoser, PWR Projects

IRC

- 1. Farber, Site Director, Zion Oversight
- G. Rogers, Senior Inspector, Zion Oversight

Indicates persons present at the exit interview on February 22, 1991.

The inspectors also contacted other licensee personnel including members of the operating, maintenance, security, and engineering staff.

2. Licensee Actions on Previous Inspection Findings (92701, 92702)

Open Items

(Closed) Open Item (295/87005-02; 304/87005-02): The ventilation system for the licensee's Technical Support Center (TSC) was determined to be unacceptable. The licensee has built a new TSC which is scheduled to be operational by March 31, 1991. Therefore, with the implementation of the new TSC, the old TSC ventilation will no longer be of concern. These items are closed.

No violations or deviations were identified.

3. Summary of Operations

Unit 1

On December 11, 1990, control room alarms indicating 1D reactor coolant pump (RCP) problems were received. The pump was secured and an investigation identified the problem as pump thrust bearing failure. The unit was placed in cold shutdown to facilitate the replacement of the RCP. The unit remained in cold shutdown during this entire period. During this forced outage, the licensee replaced the 1D RCP and performed many other major outage work items (see Paragraph 6a for more details).

Unit 2

On January 10, 1991, the unit was taken critical and on January 11, the unit was synchronized to the grid. On January 29, the licensee was granted a Temporary Waiver of Compliance and an Emergency Technical Specification change following the discovery of two containment penetrations that had not been 10 CFR 50, Appendix J, type B or C tested on either unit. On February 1, the 2A EDG tripped during a surveillance test and was declared inoperable. On February 2, the 0 EDG was declared inoperable due to a turbo-charger prelube oil leak which placed the unit on a five hour clock to hot shutdown since the two EDGs were inoperable. A UE was declared and a unit ramp down commenced. The licensee declared the 0 EDG operable after testing resulted in the acceptance criteria for stability being met and terminated the UE (see Paragraph 5). The unit operated at power levels up to 100% for the remainder of the period.

No violations or deviations were identified.

4. Operational Safety Verification and ESF System Walkdown (71707 & 71710)

a. Operational Safety

During the inspection period, the inspectors verified that the facility was being operated in conformance with the licenses and regulatory requirements and that the licensee's management control system was effectively carrying out its responsibilities for safe operation. This was done on a sampling basis through routine direct observation of activities and equipment, tours of the facility, interviews and discussions with licensee personnel, independent verification of safety system status and limiting conditions for operation action requirements (LCOARs), corrective action, and review of facility records. However, one violation was identified for failure to follow procedures which indicated a weakness in the licensee's management control system.

On a sampling basis the inspectors daily verified proper control room staffing and access, operator behavior, and coordination of plant activities with on-going control room operations; verified operator adherence with the latest revisions of procedures for

ongoing activities; verified operation as required by Technical Specifications (TS); including compliance with LCOARs, with emphasis on ESF and ESF electrical alignment and valve positions; monitored instrumentation recorder traces and duplicate channels for understanding, off-normal condition, and corrective actions being taken; examined nuclear instrumentation and other protection channels for proper operability; reviewed radiation monitors and stack monitors for abnormal conditions; verified that onsite and offsite power was available as required; observed the frequency of plant/control room visits by the station manager, superintendents, assistant operations superintendent, and noted that visits by other managers have increased; however, the number of visits are not often enough to provide good management interface and oversight of plant personnel; observed the Safety Parameter Display System for operability; and general observations of control room, housekeeping, etc.

On a periodic basis, the inspector reviewed the pre and post authorization forms for approved overtime for the operations department to verify that licensee management was controlling the use of overtime. Discussions with the operations department scheduler indicated that one individual deviated from the NRC guidelines without prior licensee management authorization during this inspection period. The inspector determined that the circumstances surrounding this incident were beyond the controls of the station's management; in that, the relief operator had overslept which caused the on-duty operator to exceed 72 hours within a 7 day period.

b. ESF Systems (71710)

During the inspection, the inspectors selected accessible portions of several ESF systems to verify status. Consideration was given to the plant mode, applicable TS, LCOARs, and other applicable requirements.

Various observations, where applicable, were made of hangers and supports; housekeeping; whether freeze protection, if required, was installed and operational; valve position and conditions; potential ignition sources; major component labeling, lubrication, cooling, etc.; whether instrumentation was properly installed and functioning and significant process parameter values were consistent with expected values; whether instrumentation was calibrated; whether necessary support systems were operational; and whether locally and remotely indicated breaker and valve positions agreed.

During the inspection, the accessible portions of the AC electrical power system; DC electrical power system; reactor protection system; residual heat removal system; containment and support system (an evaluation is documented in inspection report (295/90035; 304/90035); safety injection system; radiation monitoring system; service water system; component cooling water system; diesel generator and auxiliaries system; and control room system were inspected to verify

operability. The inspectors verified the operability of selected emergency systems, reviewed tagout records, and verified proper return to service of affected components. Tours of the auxiliary and turbine buildings were conducted to observe plant equipment conditions, including potential fire hazards, fluid leaks, and excessive vibrations and to verify the maintenance requests had been initiated for equipment in need of maintenance.

c. Onsite Event Follow-up (93702)

Potential Unit 2 Mode Change During 2B Containment Spray System Surveillance

On January 10, 1991, at 1:15 p.m., the licensee performed a PT-6B, Containment Spray Pump B System Tests and Checks, surveillance test. The purpose of PT-6B was to prove that debris (which was thought to have clogged the safety injection recirculation line and had fallen into the reactor water storage tank) were not in the suction piping of the pump. Discussions with the licensee indicated that at 2:15 p.m., the shift engineer received notice that the final valve lineup was complete and at 2:20 p.m., the shift engineer (SE) directed the unit operator to commence the unit startup. The inspector noted an entry in the control room operators' log indicated that the surveillance on the 2B Containment Spray (CS) pump was not completed until 2:45 p.m., after the reactor startup was in progress. Discussions with the Assistant Superintendent for Operations indicated that a discrepancy exists for when a surveillance is completed. The SE understood that the surveillance was complete after the actual test steps were finished, however, the operators believed that the surveillance was complete only after the paperwork received the proper signatures and review. Although not stated in the documentation, PT-6B was intended to serve as a functional test to prove that the suction line was operable, not as an operability surveillance as defined in TS 4.6.1.A.1. The inspector agreed that the functional operability of the pump was proven prior to the withdrawal of the control banks. The resident staff will continue to monitor the licensee's practice of completing tests and declaring equipment operable.

Common-unit Emergency Diesel Generator Operability Determination

Following a surveillance test failure on February 1, 1991, the station's 2A Emergency Diesel Generator (EDG) was out of service for maintenance which required surveillance testing of the 0 and 2B EDGs. Early on the morning of February 2, a surveillance test (PT-11, Diesel Generator Loading Test) was completed, however, a leak was noted on a fitting downstream of a pressure regulator on the prelude oil line for the turbocharger. The technical staff evaluated the leak and at 4:30 a.m., determined that the diesel was inoperable. This placed the unit in Technical Specification (TS) 3.15.2.H, Limiting Condition for Operation (LCO), five hours to Hot Shutdown. The reactor operator noted the inoperability in

his log and began a unit shutdown which was subsequently placed on hold waiting confirmation from the Operating Engineer (OE). At 4:50 a.m., the OE confirmed the assessment but reset the LCO clock to the time of his confirmation. An unusual event was declared due to the TS shutdown and was noted in the Shift Engineers (SE) log. A PT-14, Inoperable Equipment Surveillance Tests, was subsequently opened but the time was not logged. Following completion of repairs, a PT-11 was started at 8:37 a.m., to prove operability; the diesel was loaded to 4 Megawatts Electric (MWE) at 8:47 a.m. Although PT-11 requires a minimum of one hour loaded run and three sets of temperature data taken 20 minutes apart, the diesel was declared operable at 9:10 a.m., when temperatures were stable. The LCO was terminated at that time and the UE terminated approximately 30 minutes later.

The inspectors reviewed the following documents:

- Nuclear Station Operator Log, Book 113, page 27-34, dated February 1-2, 1991
- Shift Engineer Log, Book 174, page 09-12, 14-20, dated February 1-2, 1991
- Regulatory Guide 1.108, Revision 1, August 1977
- On-Site Review OSR/014/84, Diesel Generator Testing Requirements, April 6, 1984
- PT-11, Diesel Generator Loading Test, Revision 35, December 28, 1990
- PT-14, Inoperable Equipment Surveillance Tests, Revision 30, October 6, 1990
- W. R. Kurth's memo, Return to Operable Status, dated September 14, 1987
- PT-11, February 2, 1991 (used for required periodic test)
- PT-11, February 2, 1991 (used for O EDG return to service)
- PT-14, Appendix A, Inoperable Equipment Test Sheet, 0450/February 2, 1991
- PT-14, Appendix A, Inoperable Equipment Test Sheet, 0014/February 1, 1991

The inspectors interviewed members of the licensee staff involved in the O EDG return to service, including the Station Manager, Operating Engineer, Technical Staff Supervisors, and the Shift Engineer. The inspectors determined that the early operability

call and termination of LCO clock and Unusual Event were the result of miscommunication between the individuals involved in the event. The licensee's intent was to have operators monitor diesel temperatures and inform management when stability criteria were met; when the one-hour loaded run was completed at 9:47 a.m., PT-11 would be completed and the diesel declared inoperable. Miscommunication between the management, staff, and the Shift Engineer resulted in declaring the diesel operable when temperatures were sufficiently stable to meet PT-11 acceptance criteria.

The licensee's procedures for returning inoperable equipment to service require completion of the maintenance, satisfactory performance of required surveillance test, and closure of the PT-14 (Inoperable Equipment Surveillance Tests). At the time when the operability surveillance was started, it would have been properly completed three (3) minutes before the LCO action statement time clock expired; Unit 2 would have been required to be in Hot Shutdown at expiration.

The inspectors have determined:

- (1) The station failed to comply with PT-14, Inoperable Equipment Surveillance Tests (temporary procedure change TO-91-004 attached) by: (a) declaring O EDG operable before properly completing the specified operability test and (b) failing to properly complete Appendix A to PT-14, Inoperable Equipment Test Sheet.
- (2) The station failed to comply with PT-11, Diesel Generator Loading Test by declaring the O EDG operable without completing the required one-hour loaded run and using only one recorded set to temperatures vice the required three sets of temperature data specified in the procedure.

This is a violation (50-304/91002-01) of NRC regulations.

From a technical and engineering perspective, the safety significance of this event is minimal. The O EDG had recently completed a satisfactory PT-11 test and had been declared inoperable due to observed increase from a previously identified oil leak; the intent of the surveillance test was to verify the leak tightness of the repaired fitting. The significance of this event lies in the miscommunication of station management's intentions for restoring the inoperable EDG to service.

Unit 2 - Cation Bed Gas Release

On February 9, 1991, at 1:09 a.m., while returning the Unit 2 cation demineralizer to service, volume control tank level and pressure decreased, and the radiation monitor reading for the auxiliary building exhaust stack, ORE-0014, increased from 900 to 1500 cpm.

The control room operator entered abnormal operating procedure AOP 1.3, "Charging or Letdown Line Failure," and isolated the letdown line. The local operator was directed to re-isolate the cation demineralizer to isolate the leak. The letdown line was then returned to service and no further leakage was observed. There was a small radioactive gaseous release during this event. The instantaneous release rate was 509 microcuries/second and the total activity released was 0.43 curies. This release was 0.96 percent of the release limit for noble gases which was well below the 10 CFR 20 limits.

The investigation of the leak determined that the cation demineralizer drain valve was leaking due to a broken valve stem. The gaseous release path was through the drain line, to the auxiliary building equipment drain tank, which vents through the auxiliary building filters to the exhaust stack. The drain valve was repaired and the Unit 2 cation demineralizer was returned to service with no further leakage.

Unit 2 Rod Drive Motor Generator Set

While making rounds, the "A" operator observed high vibration on the 2B Rod Drive Motor Generator set (RDMG). This was reported to the shift. The RDMG was taken out-of-service for bearing replacement. This was a good observation made by the "A" operator while making equipment rounds.

d. Current Material Condition (71707)

The inspectors performed general plant as well as selected system and component walkdowns to assess the general and specific material condition of the plant, to verify that Nuclear Work Requests had been initiated for identified equipment problems, and to evaluate housekeeping. Walkdowns included an assessment of the buildings, components, and systems for proper identification and tagging, accessibility, fire and security door integrity, scaffolding, radiological controls, and any unusual conditions. Unusual conditions included but were not limited to water, oil, or other liquids on the floor or equipment; indications of leakage through ceiling, walls or floors; loose insulation; corrosion; excessive noise; unusual temperatures; and abnormal ventilation and lighting.

e. Radiological Controls (71707)

The inspectors verified that personnel were following health physics procedures for dosimetry, protective clothing, frisking, posting, etc., and randomly examined radiation protection instrumentation for use, operability, and calibration.

f. Security (81064)

Each week during activities or tours, the inspector monitored the licensee's security program to ensure that observed actions were implemented in accordance with the approved security plan. The inspector noted that persons within the protected area displayed proper photo-identification badges and those individuals requiring escorts were properly escorted. The inspector also verified that checked vital areas were locked and alarmed. Additionally, the inspector also verified that observed personnel and packages entering the protected area were searched by appropriate equipment or by hand. The inspectors verified that the licensee took additional security measures as a result of the Gulf crisis.

g. Assessment of Plant Operations

The licensee's operability call of the 0 EDG and the termination of the UE prior to completion of the performance test violated their procedures. This occurred due to a breakdown in communications between senior plant management and the shift engineer. Another example of a communications problem existed when a shift engineer failed to communicate to the nuclear station operator that a functional test and not a surveillance test was being performed on a CS pump. Although there was minimal safety significance for both instances, it is apparent that improvements are needed in the area of communications.

One violation was identified in paragraph 5.c for failure to follow procedures.

5. Monthly Surveillance Observation (61726)

The inspector observed TS required surveillance testing on the various systems and verified whether testing was performed in accordance with adequate procedures, whether test instrumentation was calibrated, whether limiting conditions for operation were met, whether removal and restoration of the affected components were accomplished, whether test results conformed with TS and procedure requirements and were reviewed by personnel other than the individual directing the test, and whether any deficiencies identified during the testing were properly reviewed and resolved by appropriate management personnel.

The inspector also witnessed portions of the following test activities:

- PT-11 Diesel Generator Loading Test
- PT-30 Battery Equalizing Charge
- Anticipated Transient Without a Scram (ATWS) Testing

The inspectors had no concerns with the conduct of these surveillances.

a. Surveillance Events

Snubber Testing

The licensee performed refueling snubber surveillance testing during the Unit 1 forced outage. Ten hydraulic and light mechanical small bore snubbers were tested with no failures. One large bore steam generator snubber (IAS-02) failed the as-found functional test. Due to failure of the IAS-02 snubber, the licensee expanded the sample and tested two additional large bore snubbers (AS-03 and ICS-10). Both of these snubbers passed the as-found functional test. Snubber IAS-02 was rebuilt, retested and reinstalled.

Control Room HVAC Ventilation Testing

As a result of a September 11, 1986, event in which a release of airborne radioactivity into the Auxiliary Building resulted in noble gases entering the control room, the licensee committed to conduct a test to demonstrate General Design Criteria (GDC) 19 requirements are met after modifications to the system were made. The licensee hired Lagus Applied Technology, Inc. to conduct tracer gas testing on the control room envelope and associated HVAC systems. This type of testing is routinely performed in other industries and is the accepted definitive test for complete in-leakage studies. The in-leakage into the control room envelope will be determined by testing all the negative pressure ductwork outside the control room and all the positive pressure ductwork from other HVAC systems inside the control room envelope.

The in-leakage testing on the negative pressure duct work will be done in five different locations. In these locations, a homogeneous concentration of the tracer gas will be established outside the ducting, either in a room or in a visqueen tent, and samples are taken for analysis from inside the ductwork. The in-leakage testing on the positive pressure ductwork inside the control room will be done by establishing a concentration of the tracer gas inside the duct work and taking samples from outside. The tracer gas being used is sulfur-hexafluoride (SF6) in concentrations of parts per million thru trillion. The injection gases consisted of SF6 mixed with nitrogen (N2) to predetermine mixture ratios.

The testing commenced on February 12, 1991, and is anticipated to be completed in two weeks. Results of the testing will determine if any further analysis will be needed to meet GDC 19 requirements.

b. Assessment of Surveillance

During the Unit 1 forced outage, the licensee completed refueling snubber surveillance testing. The control room HVAC ventilation testing was also performed to meet a licensing commitment to demonstrate that GDC 19 requirements are met. The results of this test will be completed in approximately one month. The Technical Staff provided good support during testing activities.

No violations or deviations were identified.

6. Monthly Maintenance Observation (62703)

Station maintenance activities affecting the safety-related systems and components listed below were observed/reviewed to ascertain that they were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with TS.

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from and restored to service; approvals were obtained prior to initiating the work; activities were accomplished using approved procedures and were inspected as applicable; functional testing and/or calibrations were performed prior to returning components or systems to service; quality control records were maintained; activities were accomplished by qualified personnel; parts and materials used were properly certified; radiological controls were implemented; and fire protection controls were implemented. Work requests were reviewed to determine the status of outstanding jobs and to assure that priority is assigned to safety-related equipment maintenance which may affect system performance.

a. Maintenance Events

Repair to Number One and Two CCHX

During this inspection period, the licensee continued their investigations and repair of the leaking CCHX, see inspection reports (295/90033(DRP); 304/90033(DRP)) for background information. Several problems occurred during the repair of the number two CCHX which caused an extension to the outage. The service water (SW) inlet and outlet valves leaked making it necessary to install inlet and outlet line stops to prevent service water leakage into the heat exchanger. After a tube cleaning inspection and 100 percent eddy current testing, 205 of 2,670 tubes had wall thickness loss of 40 percent and were plugged. A total of 7.9 percent of the tubes are now plugged. An engineering evaluation concluded that the maximum allowable plugging would be 12 percent of the tubes for the heat exchanger to still maintain the required heat transfer requirements. The cause of the tube thinning was due to corrosion pitting.

A packing leak on service water valve, SW-0033 was also repaired. However, the number two CCHX was returned to service with the SW inlet and outlet valves still leaking through the valve. It will require a dual unit outage, presently scheduled for October 1993, to repair the SW in/out let valve leaks. After assembly and testing, the end bell head on the number two CCHX was leaking. The outage slipped because of this required work. The heat exchanger flange was machined in the field. After the end bell was reinstalled, a test to determine leak tightness of the number two CCHX was satisfactorily performed. The number two CCHX was then returned to service.

The number one CCHX was then taken out-of-service for inspection. After tube cleaning, inspection, and 100 percent eddy current testing, 77 of 2,670 tubes had wall thickness loss of 40 percent or greater and were plugged. There is now 5.24 percent of the tubes plugged. The number one CCHX will return to service in the next week. The inspectors will review the licensee's investigation and conclusion to determine the cause of the ineffective June 1990 repairs to this heat exchanger.

A strength was that prior to work on the CCHXs a flooding contingency plan was developed and twenty-four hour coverage was provided for leak detection.

Degraded Control Room Ventilation Coolers

On February 6, 1991, the licensee could no longer maintain nominal temperature in the control room without opening the south control room security door and utilizing portable room coolers. With one control room cooler out-of-service (OOS) since late December, 1990, and the other cooler not working well since February 1, the resident staff requested that the licensee provide a 10 CFR 50.59 safety evaluation.

In late December 1990, the OA control room cooler was taken OOS after a work request was initiated. A portion of the corrective work was held up awaiting on-site material certification of new pressure control valve parts. (The required certification paper work was subsequently received on February 5, 1991).

On February 1, the control room temperature started to increase above the nominal temperature of 75 degrees F. A problem with the temperature control valve was identified on the OB control room cooler and a work request was initiated. The Tech Staff requested that the OA control room cooler be returned to service and run with manual pressure control.

On February 5, the OB control room cooler was secured and the OA Cooler was returned to service.

Early on the first shift on February 6, ambient control room temperature increased and was reported to have leveled off in the high 80's. The South control room door was opened and portable room coolers were utilized to help lower the control room temperature. PT-14 was entered due to the south control room security door being open and the required fire/security watches were posted.

At 9:30 a.m. on February 6, the OA control room cooler was taken OOS for installation of the new pressure control valve parts. The OB control room cooler was started and temperature was manually controlled to bring control room temperature to a nominal 75 degrees F. Control room operators initiated hourly recording of control room temperatures to trend any temperature changes.

At 10:00 a.m., control room temperature peaked at just under 91 degrees F at the control room return air duct. The control room ambient temperature at this time was approximately 82 degrees F. The OA control room cooler was returned to service after its pressure control valve was repaired. The OB Cooler was taken OOS and repairs were made to the temperature control valve.

At 12:00 p.m., the control room doors were closed and the control room ambient temperature stabilized at a nominal 75 degrees F.

The licensee came to the following conclusions after review of the applicable sections of the Updated Final Safety Analysis Report (UFSAR):

Control room temperature does not influence accident initiators and accident initiation assumptions. The UFSAR does not assume control room temperature contributes to the initiation of an accident. Additionally, on February 7, Sargent and Lundy, (an engineering firm), performed a preliminary calculation that determined that with no control room cooling, the control room fans still would maintain a positive pressure in the control room with outside ambient air temperature below the range of 37 to 44 degrees F, and that the control room will remain below a steady state temperature of 120 degrees F. On February 6, while the control room door was open, the average outside ambient air temperature at the Zion Station never exceeded the 37 to 44 degrees F range. Therefore, the probability of the occurrence of an accident previously evaluated in the UFSAR would not have been increased. Also, no unreviewed safety questions existed and that a change in TS is not required.

The resident staff had three concerns with this event: (1) the OA control room cooler was OOS since late December 1990 pending evaluation of parts received on site in November 1990; (2) Untimely action was taken by the licensee to repair one of the coolers when the shift engineer (SE) raised concerns at a Planning Meeting on February 4, 1991; and (3) the licensee has no criteria to call a malfunctioning cooler inoperable. The licensee has implemented a

system for prioritization of parts evaluations. The licensee has been sensitized to the need for evaluating the concerns raised by the SEs at planning meetings. The residents will monitor the licensee's response in these areas.

EDG Status

During this assessment period, the licensee experienced several EDG maintenance problems which affected unit operations. The most significant items are discussed below.

- (1) On February 1, 1990, the 2A EDG tripped during a surveillance test due to low lube oil pressure. The 2A EDG failure was the fifth EDG failure within the last 100 starts and in accordance with the February 1980 Confirmatory Order, the unit was placed on a twenty hour clock to hot shutdown. The licensee performed several surveillances on the 2B EDG in order to reduce the total number of failures within the last 100 starts. After two successful EDG starts, the total number of failures within 100 starts was four; thus changing the limiting condition of operation to a 44 hour clock to hot shutdown. The 2A EDG was declared operable after replacing the lube oil pump and successful completion of an operability test.
- (2) A small leak was identified OEDG on January 31, however, the licensee was unable to take the O EDG OOS until the 2A EDG was returned to service. On February 2, 1991, the O EDG was declared inoperable due to a turbocharger prelube oil leak. The leak was repaired and the O EDG was declared operable within the five hour clock limit.
- (3) On February 6, 1991, the 2B EDG was declared inoperable during a surveillance due to irregular voltage indications. This failure placed Unit 2 on a twelve hour clock to hot shutdown. The licensee replaced the voltage regulator and cleaned the field flash relay contacts. The diesel was returned to service within the limiting condition of operation.
- (4) On February 11, 1991, the 2A EDG failed its surveillance when the output breaker tripped. Further investigation indicated that a loose post in the tach generator (which indicates diesel speed) caused incorrect speed signals to the diesel generator logic circuit. The licensee replaced the tach generator and returned the EDG to service within the time clock limit. The licensee inspected all of the EDG tach generators for loose terminals.
- (5) On February 15, the O EDG was taken OOS after maintenance personnel found loose terminals on the tach generator. The tach generator was replaced.

- (6) The licensee has performed extensive maintenance on the 1A and 1B EDGs during this forced outage. The scope of the work was based on the results of the Planned Availability of Components and Systems walkdowns for the diesels. The licensee completed repairs to the 1A EDG and is currently performing corrective and preventive maintenance on the 1B EDG. The licensee intends to take the 1A EDG OOS again in the near future to perform additional work such as small tube replacements due to fretting and conducting refueling outage surveillances.

The residents attended several meetings regarding the status of the EDGs and the actions planned by the licensee to improve the reliability of the EDGs. Strategic Diesel Initiatives meetings are held regularly to discuss current problems, possible preventive maintenance actions and future modifications to improve performance. The residents will continue to monitor the licensee's efforts and correct actions.

Unit One Forced Outage Major Work Items

The following were the major work items performed during the Unit 1 forced outage: Repair of valve 1RC-8003A; 1D RCP seal replacement; 1D RCP pump replacement; number two CCHX inspection and tube plugging, number one CCHX inspection and tube plugging; 1B condenser bay boot replacement; 1A EDG material condition upgrade; 1AOV-RC8146 bonnet repair; Battery testing of batteries 011, 111 and 112; Main feed regulating by-pass valve rebuild; Main feed pump recirculation valve rebuild; MOV environmental qualification testing; large and small bore snubber testing; replacement of blowdown isolation valve; completed pressurizer spray valve modification; 1SI 8106 packing modification; APCS modification implementation; isolation valve seal water inspection and testing; containment penetration type C testing; containment penetration walkdowns; and performance of refueling surveillances.

RCP Replacement

The 1D RCP failure on December 11, 1990, was caused by thrust bearing failure. On January 1, 1991, while attempting to lift the RCP, an apparent misalignment caused a sling to break. The pump fell approximately three inches without detectable damage.

The licensee chose not to use a load cell for the lift. Failure to use a load cell did not violate any codes or standards set by the NRC or the industry. However, use of a load cell would have helped to detect a misalignment and excess strain on the cables.

The RCP was disassembled and the thrust bearing removed. The bearing and bearing journal will be sent to a hot laboratory for failure analysis. The Westinghouse site service manager said no previous

failures of thrust bearings had occurred in model 93 or 93A pumps without precursors such as high vibration which were not present for this failure. The bearing failure analysis will be reviewed for generic implications such as life-span for the thrust bearings. The RCP was replaced, recoupled and tested.

Pressurizer Spray Valves

All pressurizer spray valves, Unit 1 and 2, have the live packing modification installed. This modification should eliminate the valve stem leakage problem that existed prior to modifications.

b. Assessment of Maintenance

The licensee repaired the number one and two CCHY during the Unit 1 Outage. The outage was extended due to leaking service water inlet and outlet valves on the number two CCHX. The number one CCHX was repaired in June 1990 but developed leaks which required it to be reworked. There were 77 tubes plugged during this outage. The licensee is investigating the root cause of the ineffective June 1990 repairs.

The control room ventilation coolers were in a degraded condition for an extended period due to no prioritization system for parts evaluations.

There were numerous EDG problems during this inspection period. Many of the problems were the result of a lack of preventative maintenance. The licensee has implemented EDG walkdowns and maintenance outages in an attempt to improve the reliability of the EDGs.

No violations of deviations were identified.

7. Engineering and Technical Support (37828)

The inspectors evaluated the extent to which engineering principles and evaluations were integrated into daily plant activities. This was accomplished by assessing the technical staff involvement in non-routine events, outage-related activities, and assigned TS surveillances; observing on-going maintenance work and troubleshooting; and reviewing deviation investigations and root cause determinations.

a. Engineering Involvement

Containment Penetration Not Type B or C Tested

During this period, the technical staff conducted walkdowns of the containment penetration lines as part of a self-assessment of the licensee's 10 CFR 50, Appendix J, local leak rate testing program. On January 29, 1991, two containment penetrations were discovered that had not been type B or C leak tested for either unit:

Penetration 80 on the relief valve header to the pressurizer relief tank and penetration 76 on the accumulator test line to the holdup tanks. Technical Specification 4.10.1.a(2) and Confirmatory Order Section A-3 require these tests. A Waiver of Compliance and an Emergency Technical Specification Amendment were granted as discussed in Paragraph 8a of this report.

Several compensatory measures were taken by the licensee to ensure the integrity of these penetrations. Penetration 80 contains a single containment isolation valve, RC8079, which is required by TS 3/4.10 to be tested. The line containing the valve is seismically supported and missile protected inside containment. The licensee performed a walkdown outside of the containment to verify the integrity of all piping, flanges and relief valves. The Unit 1 and 2 RC8079 valves were radiographed and were found intact. The type C test on Unit 1 and 2 SI8961 has been performed satisfactorily on the Penetration 76 for both units. The Emergency Technical Specification Amendment exempts the licensee from performing a type C test before every startup from cold shutdown as required by the Confirmatory Order until the startup following the next refueling outage.

The licensee anticipates that the self-assessment will be completed in early March. This is considered an Open Item (295/91002-01(DRP); 304/91002-02(DRP)) pending the resolution of any testing discrepancies identified during the self-assessment.

As-Built Drawing Discrepancies

During the containment penetration walkthroughs, the licensee discovered a 3/8 inch line which appeared to have been broken at the Unit 2 penetration 86. The line was a steam generator blowdown sample line which had been abandoned in-place and according to the as-built diagram, cut and capped at both ends outside of containment some time ago. The portion of the line inside the containment is missile protected and the penetration is a Class 4 penetration. An Emergency Notification System phone call was made to notify the NRC of the potential degraded penetration. On January 24, 1991, the licensee started a modification to repair a containment penetration. When the licensee cut into the pipe (from the vertical pipe chase), the air from the penetration pressurization system forced a plug out of the line. It appears that during a 1974 modification, the piping had been cut, plugged and welded instead of abandoned in-place and capped as required by the modification and the as-built diagram.

When the line was cut into during the repairs to penetration 86, the control room received a high flow alarm from Zone 4 of the Penetration Pressurization system. The as-built diagram for this system shows Zone 1 as supplying penetration 86. Discussions with the technical staff indicated that a DVR (2-88-015) was written due to a labeling discrepancy between Zone 3 and Zone 2 on the as-built diagram. Also

during that time, a walkdown of piping between two elevations showed that several pipes were labeled as Zone 1 in one elevation and Zone 4 in the other. A Drawing Change Request was initiated to correct the above drawing discrepancies. However, it appears that an inadequate walkdown and evaluation caused the licensee to incorrectly change the Zone 1 and Zone 4 labeling on the as-built diagram.

The licensee has hired contractors to perform a field verification of the penetration pressurization system and to resolve any discrepancies in the as-built diagrams. The licensee has completed the Unit 1 field verification and noted a discrepancy relating to a testing line. This is considered an Open Item (295/91002-02(DRP); 304/91002-03(DRP)), pending the completion of the Unit 2 walkdown and resolution of the drawing discrepancies.

Potential Common Mode Failure of Auxiliary Feedwater (AFW) Pumps

On January 29, 1991, while commencing the Unit 2 shutdown, the control room received several low suction pressure alarms for the A pumps. Discussions with the licensee indicated that at the time the alarms were received, the auxiliary boiler had just been started per procedure. Investigations showed that a combination of problems existed with the deaerator tank and valve lineup resulting in a disturbance to the condensate storage tank which provides suction to the three AFW pumps. This is considered an Open Item (304/91002-04(DRP)) pending review of the root cause analysis and subsequent licensee corrective actions.

Nuclear Technical Staff Exchange Meetings

The corporate nuclear fuel service (NFS) department has set up technical exchange meetings attended by its representatives and representatives of each of the pressurized water reactors' (PWR) nuclear groups. These meetings are intended to improve the lines of communication and understanding between the nuclear stations and the corporate NFS department. These meetings also provide a forum for the exchange of information and experience among the PWR stations' nuclear groups. These meetings are held every six months with the location of these meeting rotating among corporate NFS department and the PWR stations. The last meeting was held January 18, 1991, at the Byron Station.

b. Assessment of Engineering and Technical Support

The technical staff conducted walkdowns of the containment penetration lines as part of a self-assessment of the station's leak rate testing program. Two penetrations which had not been type B or C leak rate tested were identified.

During the walkdowns, discrepancies were found in the as-built drawings for an abandoned in-place penetration plug and for the

penetration pressurization air zone supply to the penetrations. The technical staff's thorough walkdowns identified these deficiencies which were the result of a weak testing program. The technical staff continues to provide good support to all departments.

No violations or deviations were identified.

8. Safety Assessment and Quality Verification

The effectiveness of management controls, verification and oversight activities, in the conduct of the job observed during this inspection were evaluated. Management and supervisory meetings involving plant status and plans were attended to observe the coordination between departments. The results of the licensee's corrective action program were routinely monitored by attendance at meetings, discussions with the plant staff, review of deviation reports, and root cause evaluation reports.

a. Related Events

Temporary Waiver of Compliance for Untested Penetrations

On January 29, 1991, at 2:45 p.m., the licensee declared a UE following the discovery of two containment penetrations that had not been 10 CFR 50, Appendix J, type B or C leak rate tested for either unit: Penetration 80 on the relief valve header to the pressurizer relief tank and penetration 76 on the accumulator test line to the holdup tanks. Technical Specification 4.10.1.a(2) and Confirmatory Order dated February 29, 1980 Item A-3 require these tests. At the time of discovery, Unit 1 was in cold shutdown and Unit 2 was operating at 95% power.

The licensee began a power reduction and contacted the NRC for a Waiver of Compliance with regard to proceeding to hot shutdown. After a staff evaluation, a verbal approval suspending the required shutdown until February 15, 1991, was granted. The licensee terminated the UE at 8:15 p.m. and began a return to full power operation. On February 1, the NRC formally granted the Waiver of Compliance and a meeting was held in Washington, D.C. on February 6, to discuss additional licensee actions. On February 15, the NRC approved an Emergency Technical Specification Amendment which exempted (1) penetration P-80 from TS 3/4.10 testing requirements; (2) penetration P-76 from testing required by the Confirmatory Order Item A-3; and (3) exempt untested pathways evaluated and found acceptable based on established criteria during the Zion Containment Local Leak Rate Testing Self-Assessment from testing requirements of TS 3/4.10 and the Confirmatory Order until March 11, 1991. This time frame allows the licensee to complete the self-assessment program, to evaluate the effect of any deficiency on operability and to take appropriate corrective actions.

Safety Evaluation for Degraded Control Room Ventilation Coolers

The Safety Evaluation concluded that the control room fans would have maintained a positive pressure in the control room. The evaluation further concluded that with the low outside ambient temperature, the control room temperature would have remained below the FSAR limits without the use of portable cooling. The Safety Evaluation was timely and thorough.

Zion's Current Motor Operated Valve Stroking Practices

The licensee took the following actions in response to the Quad Cities motor operated valve (MOV) stroking practices that resulted in a loss of coolant accident on January 24, 1991. The Operation's staff was informed and cautioned of the risks by memo from the Assistant Superintendent of Operations. The initial Quad Cities event information was discussed with Zion's Department Head Level Management in all maintenance areas on January 25, 1991. The discussion covered the administrative controls and work practices in place at Zion.

On January 28, 1991, a more detailed look at work procedures and written work practices concerning work and inspection of valves was undertaken by the licensee. The licensee review showed that: maintenance and administrative procedures should prevent the type of event which occurred at Quad Cities; The MOVs are only stroked electrically by the Unit Operator from the control room; that the licensed shift supervisor must sign the procedure step prior to manual stroking of an MOV by maintenance personnel.

The resident staff's review of this data concludes that the probability of a loss of coolant accident similar to Quad Cities is unlikely.

b. Assessment of SAQV

The licensee declared a UE following the discovery of two containment penetrations that had not been type B or C leak rate tested for either unit during a technical staff system walkdown. A timely Temporary Waiver of Compliance and Emergency Technical Specification change request was submitted to prevent a Unit 2 shutdown and to extend the testing requirement time. A Safety Evaluation for degraded control room ventilation coolers was timely and thorough. The licensee's actions in response to the Quad Cities motor operated valve stroking practices that resulted in a loss of coolant was thorough. The Operations staff was quickly notified by memo of the event and what precautions to take. The maintenance department did an extensive procedure review and made necessary revisions to reduce the probability of a loss of coolant accident.

No violations or deviations were identified.

9. LER Followup (92700)

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with TS. The LERs listed below are considered closed:

Unit 1

- 295/90011 Uncontrolled Reactor Head Vent Release
- 295/90020 Inadvertent auto start of 1A AFW Pump
- 295/90023 Unit 1 Shutdown due to EDG Inoperability

Regarding LER 295/90011, this event was discussed in previous inspection reports, (295/90006 and 295/90022). A violation regarding failure to submit a LER within 30 days was closed in inspection report (295/91003; 304/91003). The inspector had no further concerns. This LER is closed.

Regarding LER 295/90020, this event consisted of two separate events while replacing Bus 144 relay 27-2/XA. The first event was due to personnel error and the second event was due to a procedural weakness compounded by personnel error. Corrective actions include supplementing procedures and holding discussions with affected associated departments on the need to reduce personnel errors. The LER is considered closed.

Regarding LER 295/90023, the 0 and 1A EDGs were declared inoperable; thus requiring a unit shutdown. The apparent cause of the 0 EDG failure was the degradation of the o-rings in the manual start valves resulting from contamination of the pressurized air and elevated ambient room temperatures. This LER is considered closed.

Unit 2

- 304/90003 Inoperable Fire Barrier in 2A EDG Room
- 304/90008 Inadvertent Start of 2C CS Pump due to Personnel Error
- 304/90012 Violation of TS Action Statement due to Personnel Error

Regarding LER 304/90003, an allegation was received by the NRC concerning the laundry hose and was assigned to the licensee for investigation. The investigation has been reviewed and closed by regional inspectors. The resident inspectors have no further concerns and consider this LER closed.

Regarding LER 304/90008, this LER was reviewed and closed in inspection report (295/90017; 304/90019); however, it was inadvertently referenced as Unit 1. This LER is closed.

Regarding LER 304/90012, the licensee failed to establish a continuous firewatch when the 2A charging pump room damper was declared inoperable. The root cause was attributed to personnel error, in that, the testing engineer incorrectly communicated to the shift that the fire detection system was operable which resulted in the initiation of an hourly firewatch. The inspector noted that the unit supervisor identified the mistake and established a continuous firewatch on October 22, 1990. A Deviation Report (DVR) was initiated on October 28, by the system engineer and the operating engineer reviewed the event for reportability on November 9. Zion Administrative Procedure, ZAP 15-52-1, "Deviation and Reportable Event Reporting," requires that a DVR be initiated within a shift of discovery and reviewed by the operating engineer for reportability within five days. The failure to follow ZAP 15-52-1 resulted in the LER being submitted approximately 48 days after a senior licensed operator discovered the event. This appears to be an isolated case. This issue meets the criteria specified in 10 CFR 2, Appendix C, V.A.; therefore, no notice of violation was cited (304/91002-05(DRP)). The inspector had no further concerns.

In addition to the foregoing, the inspectors reviewed the licensee's DVRs generated during the inspection period. This was done in an effort to monitor the conditions related to plant or personnel performance and any potential trend. Deviation reports were also reviewed to ensure that they were generated appropriately and dispositioned in a manner consistent with the applicable procedures and the quality assurance manual.

There was one inspector identified violation that was administrative in nature.

10. Training (41400)

During the inspection period, the inspectors reviewed abnormal events and unusual occurrences which may have resulted, in part, from training deficiencies. Selected events were evaluated to determine whether the classroom, simulator, or on-the-job training received before the event was sufficient to have either prevented the occurrence or to have mitigated its effects by recognition and proper operator action. Personnel qualifications were also evaluated. In addition, the inspectors determined whether lessons learned from the events were incorporated into the training program.

Events reviewed included the events discussed in this report. In addition, LERs were routinely evaluated for training impact.

The resident inspectors were provided a presentation on the Training Department's actions and goals for 1991. The topics covered staff increases, major projects, some early success and major milestones. If successfully implemented, these programs should strengthen the training for all station departments.

No violations or deviations were identified.

11. Open Items

Open Items are matters which have been discussed with the licensee which will be reviewed further by the inspector and which involve some action on the part of the NRC or licensee or both. Three Open Items disclosed during this inspection are discussed in Paragraph 7a.

12. Temporary Waiver of Compliance

A temporary Waiver of Compliance is a vehicle for the NRC to grant relief from TS limiting conditions of operations or other requirements in certain limited circumstances in which a license amendment would not be appropriate. The intent of such discretion is to promote safety by not imposing unnecessary transients on an operating plant or not delaying reactor startup due to literal reading of TS under certain circumstances where there is no safety reduction. One Temporary Waiver of Compliance is discussed in Paragraph 8a.

13. Exit Interview (30703)

The inspectors met with licensee representatives (denoted in Paragraph 1) throughout the inspection period and at the conclusion of the inspection on February 22, 1990, to summarize the scope and findings of the inspection activities. The licensee acknowledged the inspectors' comments. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspectors during the inspection. The licensee did not identify any such documents or processes as proprietary.