

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-295/85016(DRP); 50-304/85016(DRP)

Docket Nos. 50-295; 50-304

License Nos. DPR-39; DPR-48

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

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

Inspection At: Zion, IL

Inspection Conducted: April 2 through April 29, 1985

Inspectors: M. M. Holzmer

L. E. Kanter

J. N. Kish

Approved By: *John F. Suerman*
G. C. Wright, Chief
Reactor Projects Section 2A

5/13/85
Date

Inspection Summary

Inspection on April 2 through April 29, 1985 (Report Nos. 50-295/85016(DRP); 50-304/85016(DRP))

Areas Inspected: Routine, unannounced resident inspection of licensee action on previous inspection findings; reactor head maintenance; Unit 1 boron dilution event; operational safety and ESF walkdown; surveillance; maintenance; LERs; and Region III requests. The inspection involved a total of 230 inspector-hours onsite including 41 inspector-hours onsite during off-shifts.

Results: Of the eight areas inspected, no violations or deviations were identified in six areas, and two violations were identified in the remaining two areas (violation of 10 CFR 50.54 - paragraph 2; and violation of Technical Specification 3.17.2 - paragraph 9).

DETAILS

1. Persons Contacted

*K. Graesser, Station Manager
*G. Pliml, Superintendent, Production
*T. Rieck, Superintendent, Services
*E. Fuerst, Assistant Station Superintendent, Operations
*K. Kofron, Assistant Station Superintendent, Maintenance
R. Budowle, Unit 1 Operating Engineer
J. Gilmore, Unit 2 Operating Engineer
L. Pruett, Radwaste Operating Engineer
M. Carnahan, Training Supervisor
W. Kurth, Assistant Superintendent
R. Cascarano, Technical Staff Supervisor
A. Ockert, Assistant Technical Staff Supervisor
*C. Schultz, Assistant Technical Staff Supervisor
R. Aker, Station Health Physicist
*J. Ballard, Quality Control Supervisor
*W. Stone, Quality Assurance Supervisor

*Indicates persons present at exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Open Item (295/84020-07) Review of AOP-7 following failure to determine quadrant power tilt ratio with channel N-42 inoperable. Procedure AOP-7 was reviewed and found to contain adequate instructions for determination of quadrant power tilt.

(Closed) Unresolved Item (295/85012-03) Operator temporarily away from the controls. This item was left unresolved pending determination of severity level by a Region III enforcement board. The board concluded that this represented a violation of 10 CFR 50.54(m)(2)(iii) which requires that for each fueled nuclear power unit, a licensed operator or senior operator shall be present at the controls at all times. The severity level is noted in the Notice of Violation which accompanies this report (295/85016-01).

(Closed) Open Item (295/84007-02; 304/84007-02) Modification to Provide Indication of Loss of Flow Condition for Service Building Exhaust Radiation Monitor (ORT-PR22). Implementation of a modification to provide this indication in the Control Room was reviewed and found acceptable.

No other violations or deviations were identified.

3. Summary of Operations

Unit 1 remained in cold shutdown undergoing a refueling outage for the duration of the inspection period.

Unit 2 operated at power levels up to 100 percent throughout the inspection period. No reactor trips or unplanned shutdowns occurred.

4. Reactor Head Maintenance

On April 3, 1985, the licensee reported to the NRC Senior Resident Inspector that during an inspection of the reactor head assembly conducted on April 2, 1985, the alignment funnel for the control rod drive shaft thermal sleeve for rod F-8 was missing. The funnel was found on top of its respective control rod guide tube on the reactor vessel upper internals. The thermal sleeves help to minimize the thermal shock on the head penetration welds after scrams, and the funnels aid in alignment of the control rod drive shafts in the thermal sleeves when replacing the reactor vessel head.

The funnel was recovered and welded to its respective thermal sleeve in accordance with a special procedure provided by the manufacturer (Westinghouse). The funnels are normally threaded and pinned in place. Determination of the mode of failure is under investigation by Westinghouse. The other funnels were checked and found to be in place, however, one other funnel (H-8) was found to be loose. This funnel was also welded in place.

On April 8, 1985, the licensee reported to the NRC Senior Resident Inspector that while replacing the reactor vessel head on April 7, 1985, control rod drive shaft 10 was found to be misaligned from its respective thermal sleeve. The thermal sleeve was found to be bent and there was slight bowing of the control rod drive shaft. It is not known whether the thermal sleeve or drive shaft was bent prior to replacing the head, or whether the misalignment caused the bending. The licensee is investigating the cause of this event with the help of Westinghouse. The licensee has determined by testing that there was no damage to the control rod or to the fuel.

The control rod drive shaft was replaced with an onsite spare. The bent thermal sleeve was removed and replaced in accordance with Station Work Request #Z41044. Removal of the bent thermal sleeve involved cutting the omega seal weld between the rod travel housing and the latch housing, unthreading the latch housing, and removal of the latch assembly. After the bent thermal sleeve was removed, a replacement was inserted, and the components were reassembled. An alignment funnel was attached to the thermal sleeve, and the reactor head was replaced without any additional problems. Reweld of the omega seal is scheduled to take place during the week of April 29, 1985.

No violations or deviations were identified.

5. Unit 1 Boron Dilution Event

On April 2, 1985, the Unit 1 reactor cavity was inadvertently diluted during the ECCS full flow test. The purpose of the test was to verify ECCS flow characteristics by pumping from the refueling water storage

tank (RWST) into the reactor vessel and measuring certain flow rates. The boron concentration of the reactor cavity before the test was 2766 ppm. The minimum boron concentration needed to keep the unit greater than 10% shutdown was 2000 ppm. During the test, water from the RWST was injected into the reactor vessel at a concentration of approximately 1480 ppm.

Prior to the event, the April 2, 1985 midnight residual heat removal (RHR) sample was reported to be 2767 ppm. The 7:45 a.m. RHR sample was 2765 ppm. The 4:30 p.m. sample that day was 2702 ppm, prompting the Shift Engineer (SE) to request another sample for verification. At about 5:45 p.m. the ECCS full flow test was commenced, and at 6:45 p.m. the resample was taken. The resample results were reported after the completion of the test as 2664 ppm, and the SE ordered RWST samples in an attempt to determine the source of the low RHR boron concentrations. RWST sample results were 1380 and 1537 ppm at 9:30 and 10:30, respectively. Three RHR samples were drawn at 12:40 a.m. (2 samples) and 1:45 a.m. on April 5, 1985, with results of 2094, 2091, and 2095 ppm respectively. Afterwards, RHR and cavity boron concentrations increased to about 2500 ppm as the water in the RHR, reactor vessel and reactor cavity continued to mix to equilibrium. There was no noticeable increase in audible source range count rate, although the SE noticed a slight increase in the strip chart recorder trace.

The licensee suspected that the requirement to maintain a 10% shutdown margin may have been violated, and notified the NRC. Subsequent analysis of the increase in source range count rate indicated that the 10% shutdown margin was not violated.

The low RWST boron concentration was attributed to leakage of primary (pure) water past 1VC-8434 and 1VC-0016, two reach-rod operated diaphragm valves in the volume control (VC) system. 1VC-0016 had been manipulated during the VC system hydrostatic test conducted on March 20, 1985. The position of these valves is sometimes difficult to determine because of the operation of the reach rods and because it is difficult to determine when the rubber diaphragm is properly compressed.

The licensee has initiated the following corrective actions:

- a. RWST level will be recorded each shift while shutdown.
- b. A sample will be taken when a level increase of 1/2 foot occurs.
- c. The RWST will be sampled prior to being used for makeup to the cavity.
- d. The RWST will be sampled weekly.
- e. The RWST will be mixed using the containment spray pump and sampled prior to subsequent ECCS full flow tests.
- f. The primary water line to valve 1VC-0016 will be cut and blanked in a future plant modification.

While there were no violations of regulatory requirements or procedures, the event is indicative of weak operating practices. It is a common industry practice to sample tanks prior to placing them in service. The corrective actions taken by the licensee should prevent recurrence.

No violations or deviations were identified.

6. Operational Safety Verification and Engineered Safety Features System Walkdown

The inspectors observed control room operations, reviewed applicable logs and conducted discussions with control room operators from April 2-29, 1985. During these discussions and observations, the inspectors ascertained that the operators were alert, fully cognizant of plant conditions, attentive to changes in those conditions, and took prompt action when appropriate. 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 that maintenance requests had been initiated for equipment in need of maintenance.

The inspectors by observation and direct interview verified that the physical security activities were being implemented in accordance with the station security plan.

The inspectors observed plant housekeeping/cleanliness conditions and verified implementation of radiation protection controls. From April 2, 1985 to April 29, 1985 the inspectors walked down the accessible portions of the auxiliary feedwater, component cooling, and service water systems to verify operability. The inspectors also witnessed portions of the radioactive waste system controls associated with radwaste shipments and barreling.

These reviews and observations were conducted to verify that facility operations were in conformance with the requirements established under Technical Specifications, 10 CFR and administrative procedures.

No violations or deviations were identified.

7. Monthly Surveillance Observation

The inspector observed Technical Specifications required surveillance testing on the rod control system and selected parts of the reactor coolant system and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that limiting conditions for operation were met, that removal and restoration of the affected components were accomplished, that test results conformed with Technical Specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that 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-1 Rod Cluster Control Exercise

PT-2F Pressurizer Relief Valve Isolation Test

PT-2G Accident Monitoring Instrumentation Channel

No violations or deviations were identified.

8. Monthly Maintenance Observation

Station maintenance activities on safety related systems and components listed below were observed or reviewed to ascertain whether they were conducted in accordance with approved procedures, regulatory guides industry codes or standards and in conformance with Technical Specifications.

The following items were considered during this review: the limiting conditions for operation were met while components or systems were removed from 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 prevention controls were implemented.

Work requests were reviewed to determine status of outstanding jobs and to assure that priority is assigned to safety related equipment maintenance which may affect system performance.

The following maintenance activities were observed or reviewed:

1C Service Water Pump Motor
Unit 1 Reactor Head Maintenance

Unit 1 reactor head maintenance is detailed in paragraph 4 of this report.

No violations or deviations were identified.

9. Licensee Event Reports (LER) Followup

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 Technical Specifications. The LERs listed below are considered closed:

UNIT 1

LER NO.

DESCRIPTION

295/85010 Inoperable Aircraft Fire Protection System

UNIT 2

LER NO.

DESCRIPTION

304/85004 Failure of Service Water Safeguards Valve During PT-10

304/85006 Containment Air Sampling Isolation Valve 2FCV-PR24B Failed Shut

304/85007 Failure to Shut down in 12 Hours for O Diesel Generator Out of Service

With regard to LER 295/85010 "Inoperable Aircraft Fire Protection System," the reset switch had been held in the "reset" position by means of a paper clip. The licensee was unable to determine who defeated the system. Operation with the O diesel generator aircraft fire protection system inoperable and not placed in the accident mode is a violation of Technical Specification 3.17.2. This is considered a Violation as noted in the Appendix (295/85016-02).

The licensee has issued a Standing Order to inform all operations personnel that defeating safety systems outside the approved management control systems is strictly prohibited. No other actions are considered necessary at this time, and this item is considered closed.

No violations or deviations were identified.

10. Followup of Region III Requests

Station Battery Surveillance and Maintenance

In a memorandum from C. E. Norelius dated March 25, 1985, all resident inspectors were requested to conduct an inspection of their respective station's safety related battery surveillance and maintenance practices. In accordance with the above request, the inspectors reviewed battery surveillance, charging, and test discharging procedures, inspected three of the five battery rooms, and examined station battery records. The inspectors also conducted an interview with the responsible technical staff engineer.

The following procedures were reviewed:

PT-0, Appendix K Station Battery Daily Record

PT-30 Station Battery - Monthly Quarterly Equalizing Charge

PT-32 Containment Spray/Fire Pump Battery Record

T.S.S.15.6.38.A 125 Volt DC Battery Performance Test

T.S.S.15.6.38.B Battery Charger Performance Test

These procedures were found to be technically adequate, to have proper acceptance criteria, and to record sufficient information to make reasonable assessments of performance trends. The licensee uses certified hydrometers and thermometers for measurements of specific gravity and individual cell temperature, and records the appropriate instrument identification number on the surveillance sheets. The Procedures were prepared using the information in IEEE 450-1980 "IEEE Recommended Practice for Maintenance, Testing, and Replacement of Large Stationary Type Power Plant and Substation Lead Storage Batteries." The engineer in charge of the batteries had been the responsible engineer for approximately three years, providing continuity of performance history. In addition, he was a member of the company's task force on station batteries which meets to consider solutions to common battery problems.

No violations or deviations were identified.

Seismic Qualification of Battery Racks

In a memorandum from C. E. Norelius dated March 4, 1985, all resident inspectors were requested to conduct an inspection of a potential problem with the spacing between the end battery cells and the rack stringers. Commonwealth Edison Company reported to the NRC Region III office on November 21, 1984 that the gap between the end cell and the battery rack was greater in some cases than the maximum dimension used by the manufacturer in their seismic qualification tests. This condition existed at the LaSalle, Dresden, Quad Cities, Byron, Braidwood, and Zion Stations. The manufacturer, GNB Batteries, Inc., was requested to make a report of the problem pursuant to 10 CFR Part 21. GNB Batteries, Inc., responded in a letter dated January 22, 1985.

As requested by the March 4, 1985 memorandum the resident inspectors verified that:

- a. the licensee has been notified by GNB pursuant to 10 CFR Part 21,
- b. the licensee has taken interim corrective measures and has initiated a modification to implement permanent corrective action,
- c. the end gaps of all batteries were measured by the licensee, and for two of them, the gap exceeded the 1/4" gap used during testing by GNB. The resident inspector took sample measurements to confirm the licensee's measurements.

- d. the licensee is investigating the matter of the distance between the end cells and the side stringers. The resident inspector examined a sample of these gaps and there does not appear to be excessive clearances.

As interim corrective measures, the licensee has taped 2" x 12" treated wooden strips to the side stringers to bring the end gap to within 1/4". The final modification will provide adjustable end stringers, and inserts between each cell to minimize the potential for shifting.

No violations or deviations were identified.

Main Steam Isolation Valve (MSIV) Actuation

In a memorandum from C. E. Norelius dated March 22, 1985, all resident inspectors were requested to conduct an inspection of MSIV configuration and testing as a result of a failure of two MSIV's to stroke within the required 5 seconds at the Byron Station. Resident inspectors were to determine whether similar problems could occur at their sites.

Zion is in the process of upgrading the Unit 1 MSIV operators to meet environmental qualification requirements. Unit 2, which is currently operating, will have these upgrades installed during the Fall 1985 refueling outage.

The Byron failures resulted from the failure of check valves in the instrument air system which gradually bled down the portion of the system which repositions pilot valves in order to stroke the MSIV's closed. Neither of the configurations at Zion depends on instrument air to perform the containment isolation function. Furthermore, neither configuration depends on check valves to seat in order to stroke the valves closed. The Unit 2 configuration is made of components supplied by various manufacturers. The Unit 1 configuration is supplied principally by Chicago Fluid Power.

No violations or deviations were identified.

11. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) throughout the inspection period and at the conclusion of the inspection on April 29, 1985 to summarize the scope and findings of the inspection activities. The licensee acknowledged the inspectors' comments. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents or processes as proprietary.