

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/88009(DRP); 50-265/88010(DRP)

Docket Nos. 50-254, 50-265

Licenses No. DPR-29; DPR-30

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facility Name: Quad Cities Nuclear Power Station, Units 1 and 2

Inspection At: Quad Cities Site, Cordova, IL

Inspection Conducted: April 3 through June 4, 1988

Inspectors: F. L. Higgins
A. D. Morrongiello

Approved By: *[Signature]*
M. A. Ring, Chief
Reactor Projects Section 1B

6/7/88
Date

Inspection Summary

Inspection on April 3 through June 4, 1988 (Reports No. 50-254/88009(DRP); 50-265/88010(DRP))

Areas Inspected: Routine, unannounced resident inspection of Operations, Maintenance, Surveillance, LER Review, Routine Reports, Temporary Instructions, Administrative Controls Affecting Quality, Radiation Control, and Outages.

Results: In the areas inspected, no violations were identified other than those described in inspection reports written by region-based inspectors.

DETAILS

1. Personnel Contacted

- *R. Bax, Station Manager
- *T. Tamlyn, Production Superintendent
- *D. Gibson, Regulatory Assurance Supervisor
- *J. Wethington, Quality Assurance Supervisor

*Denotes those present at the exit interview on June 3, 1988.

The inspectors also contacted and interviewed other licensee and contractor personnel during the course of this inspection.

2. Operations (71707, 93702)

The inspectors, through direct observation, discussions with licensee personnel, and review of applicable records and logs, examined plant operations. The inspectors verified that activities were accomplished in a timely manner using approved procedures and drawings, and were inspected/reviewed as applicable; procedures, procedure revisions and routine reports were in accordance with Technical Specifications, regulatory guides, and industry codes or standards; approvals were obtained prior to initiating any work; activities were accomplished by qualified personnel; the limiting conditions for operation were met during normal operation and while components or systems were removed from service; functional testing and/or calibrations were performed prior to returning components or systems to service; independent verification of equipment lineup and review of test results were accomplished; quality control records were properly maintained and reviewed; parts, materials and equipment were properly certified, calibrated, stored, and or maintained as applicable; and adverse plant conditions including equipment malfunctions, potential fire hazards, radiological hazards, fluid leaks, excessive vibrations, and personnel errors were addressed in a timely manner with sufficient and proper corrective actions and reviewed by appropriate management personnel.

(a) Engineered Safety Features System Walkdown (71710)

During plant tours of Units 1 and 2, the inspectors walked down the accessible portions of the High Pressure Coolant Injection Systems, Reactor Core Isolation Cooling Systems, Core Spray Systems, Residual Heat Removal Systems, Standby Liquid Control Systems, Standby Gas Treatment Systems, Diesel Generators, and Station Batteries.

(b) Summary of Operations

Unit 1

During the inspection period, the unit operated either at full power, on Economic Generation Control (EGC), or at reduced power in order to

perform surveillance testing or to comply with load dispatcher orders, until April 8, 1988, when an EHC leak in a line to the number 3 control valve of the Unit 1 main turbine necessitated that the main generator be removed from the electrical grid. Unit 1 remained critical at less than 1% power. Repairs were made to the EHC system, and Unit 1 was reconnected to the electrical grid on April 10, 1988.

The unit then operated either at full power, on EGC, or at reduced power in order to perform surveillance testing or to comply with load dispatcher orders, until May 7, 1988, when the unit was shut down for a scheduled maintenance outage. Criticality was reestablished on May 15, 1988, at the completion of the maintenance outage, and the unit was reconnected to the electrical grid on May 16, 1988.

The unit then operated either at full power, on EGC, or at reduced power in order to perform surveillance testing or to comply with load dispatcher orders, until May 30, 1988, when the unit was removed from the electrical grid to replace a faulty fast acting solenoid on the #4 control valve. The unit remained critical and was reconnected to the electrical grid later in the day on May 30, 1988.

For the remainder of the inspection period Unit 1 operated either at full power, on Economic Generation Control (EGC), or at reduced power in order to perform surveillance testing or to respond to load dispatcher orders. As of the end of the inspection period the unit has been critical for 20 consecutive days.

Unit 2

During the inspection period, the unit operated either at full power, on Economic Generation Control (EGC), or at reduced power in order to perform surveillances or to comply with load dispatcher orders, until the unit was shut down on 4/10/88 to begin a scheduled 10 week refueling outage. The unit remained in an outage status throughout the rest of the inspection period.

(c) Unit 2 SJAE Suction Valves Shut While at Power

At 10:00 a.m. CDT on April 3, 1988, with Unit 2 at 90% power, the steam jet air ejector (SJAE) suction butterfly valves 2-5401A and B for Unit 2 closed due to an isolation signal from low pressure switch 2-3041-21B. This pressure switch initiates automatic closure of the SJAE suction valves at or below 100 psi steam supply to the third stage jet to prevent condenser in-leakage upon loss of SJAE steam supply. The steam supply to the third stage jet remained above 100 psi during the event, so a ground was suspected to have caused the isolation. Low voltage was detected in the circuit, but the ground disappeared and the system was returned to normal with the SJAE suction valves restored to their open position.

When the SJAE suction valves shut, the condenser backpressure should have increased significantly, but the condenser backpressure remained unchanged. This indicates that there is a problem with the SJAE suction valves causing them to leak excessively. Excessive leakage would create a path for the release of radioactivity should high radiation levels occur in the main steam line while the mechanical vacuum pump was operating. The SJAE suction butterfly valves will be inspected during the Unit 2 outage scheduled to begin on April 10, 1988. Refer to section 10(g) of this report.

(d) Unit 1 EHC Leak and Group I Isolation

At 1:25 a.m. on April 8, 1988, an EHC leak was discovered in a line to the number 3 control valve of the Unit 1 main turbine. A Unit 1 shutdown was immediately begun. At 3:45 a.m. on April 8, 1988, the Unit 1 main generator was removed from the electrical grid, though Unit 1 remained critical at less than 1% power. At 12:20 p.m. on April 8, 1988, the leak was repaired, but the number 3 control valve would not open as required.

With the reactor mode selector switch in startup/hot standby, the reactor pressure was reduced to 840 psig at 6:00 p.m. on April 8, 1988. Immediately a Group I isolation occurred, causing the MSIVs to shut. In addition, a half scram on the "A" reactor protection system and an APRM downscale rod block occurred. With the mode selector switch in Startup/Hot Standby none of these protective actions should have occurred. The mode selector switch was moved past the Startup/Hot Standby position to the Refuel position, resetting the half scram and the Group I isolation, and clearing the downscale APRM rod block. At 6:22 p.m. the MSIVs were reopened. The Unit 1 reactor remained critical throughout the event. At 6:50 p.m. the NRC Emergency Operations Center was notified.

At 10:20 a.m. on April 9, 1988, excessive movement was found in the mode selector switch, preventing the bypass contacts from closing when the switch was moved from Run to Startup/Hot Standby. Moving the switch to a point midway between the Refuel and Startup/Hot Standby positions will close the bypass contacts. Until the mode selector switch can be repaired during the next refueling outage on Unit 1, administrative controls have been established to require the operators to move the mode selector switch to a midpoint between the Refuel and Startup/Hot Standby positions when moving the switch from the Run to the Startup/Hot Standby position, and then to physically verify that the contacts have closed prior to reducing reactor pressure to 850 psig.

The cause of the malfunctioning number 3 control valve was determined to be a blocked orifice in the line to the servo on the number 3 control valve. The blockage was cleared, and at 10:51 a.m. on April 10, 1988, Unit 1 began increasing power. At 3:23 p.m. on April 10, 1988, Unit 1 was connected to the electrical grid. As of 8:30 a.m. on April 11, 1988, Unit 1 is at 98% power.

It is thought that the cause of the EHC leak was fatigue failure of the line due to vibration and personnel stepping on the line itself. Corrective action entails installing a protective cover over the line so no one will step on the line in the future. The protective cover is planned to be installed during the next refueling outage.

3. Monthly Maintenance Observation (62703)

Station maintenance activities of safety related and non-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 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 procedures were followed. 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.

Portions of the following activities were observed/reviewed:

- (1) Disassembly of the Unit 2 Main Turbine.
- (2) Repair of the Unit 2 recirculation pump suction and discharge valves.
- (3) Ultrasonic test of the welds on the recirculation loop risers.
- (4) Weld overlays of the recirculation loop end cap.
- (5) Weld overlays of the recirculation loop risers.
- (6) Repair of the Unit 1 recirculation pump controller.
- (7) Unit 2 ATWOS support installation.
- (8) Unit 1 torus vacuum breaker inspection.
- (9) Unit 1 electromatic relief valve testing.
- (10) Cleaning and repair of 4160 volt circuit breakers.
- (11) Repair of the cubicle in Bus 23 which was damaged on October 19, 1987, when the circuit breaker for the 2A CRD pump was racked out with the circuit breaker shut and the pump running.

- (12) Repair of the pressure control valve on the Unit 2 seal oil system.
- (13) Overhaul of the 1/2 Diesel Generator.
- (14) Reassembly of the B fire pump.
- (15) Repairs to the traveling screens.
- (16) Repairs to the Unit 2 feedwater drag valve.
- (17) Repairs to the Unit 2 condenser reversing valves.
- (18) Readjusting pickup voltage on the Unit 2 HPCI suction valve.
- (19) Calibration of the controllers for the Unit 2 reactor water clean up demineralizers.
- (20) Calibration of the Unit 2 feedwater heater level control switches.

No violations or deviations were identified other than those listed in Inspection Reports 50-254/88011(DRS) and 50-265/88012(DRS).

4. Monthly Surveillance Observation (61726)

The inspectors observed Technical Specifications-required surveillance testing 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.

Portions of the following activities were observed/reviewed:

- (1) Unit 1 electromatic relief valve operability tests.
- (2) Unit 2 125 volt battery discharge test.
- (3) Unit 2 reactor vessel internal inspection.
- (4) Unit 1 RCIC monthly and quarterly surveillances from the control room.
- (5) Chemical addition to the Unit 2 Standby Liquid Control Tank.
- (6) LPRM calibration on Unit 1.
- (7) Service water radiation monitor functional test.
- (8) Unit 1 hot scram timing.

(9) Preparation for the Unit 2 primary containment integrated leak rate test.

(10) Security uninterruptible power supply surveillance.

No violations or deviations were noted.

5. LER Review (92700)

(1) Unit 1

- (a) (Closed) LER 88006, Revision 00: Missed Technical Specification Required Surveillance Due to Scheduling Lapse.

This item was discussed in Inspection Report 254/88004(DRP) paragraph 4.

- (b) (Closed) LER 88007, Revision 00: 1/2 A SBGTS Inoperable When Plastic was Draped Over the Intake Bell.

This item was discussed in Inspection Report 254/88004(DRP) paragraph 2.

- (c) (Closed) LER 87033, Revision 00: Inadvertent Control Rod Scram During Scram Timing Due to Test Panel Design Deficiency and Personnel Error.

This item was discussed in Inspection Report 254/88004(DRP). The resident inspectors verified that the corrective actions are in place and noted that there were no such occurrences during subsequent testing.

- (d) (Closed) LER 88008, Revision 00: Group I isolation in Startup/Hot Standby.

This item is discussed in paragraph 2 of this report.

- (e) (Closed) LER 87031, Revision 00: Failure of HPCI Minimum Flow Valve to Open Due to Air in Flow Switch Lines Because of Outage Scheduling Deficiency.

This item was discussed in Inspection Report 254/87033(DRP).

(2) Unit 2

- (a) (Open) LER 88007, Revision 00: Feedwater Check Valves 2-220-58B and 62B Failed their Local Leak Rate Test.

This item is discussed in paragraph 10(a). A supplemental report will be issued discussing the cause(s) of their failure.

- (b) (Closed) LER 88005, Revision 00: Unit Two Reactor Scram Due to Feedwater Regulating Valve Packing Failure.

This item was discussed in Inspection Report 265/88004(DRP) paragraph 2.

- (c) (Closed) LER 88002, Revision 00: High Pressure Coolant Injection Inoperable Due to Room Cooler Loss From Short Circuit of Control Relay.

This item was discussed in Inspection Report 265/88004(DRP) paragraph 2.

- (d) (Closed) LER 88003, Revision 00: RCIC inoperable due to a failed remote hydraulic servo on the turbine governor.

This item was discussed in Inspection Report 265/88004(DRP) paragraph 2.

- (e) (Open) LER 88008, Revision 00: Linear Indications on Reactor Water Cleanup System Weld Due to Postulated Stress Corrosion Cracking.

This item is being followed by a regional based inspector.

6. Review of Routine and Special Reports (90713)

The inspectors reviewed the Monthly Performance Reports for the months of March and April 1988.

No violations or deviations were identified.

7. Temporary Instruction Followup (61726)

Temporary Instruction 2515/95, Inspection for Verification of BWR Recirculation Pump Trip Multiplant Action Item C-02.

The inspector verified that the licensee has installed a pump trip that is actuated by low low vessel water level or by high reactor vessel pressure.

8. Administrative Controls Affecting Quality (42700)

Several drawings and procedures were checked for adequacy and accuracy. Errors found were brought to the attention of the licensee and are in the process of being corrected. No violations or deviations were identified.

9. Radiation Control (71709)

Periodic inspections of plant radiological control conditions were made during the inspection period. Isolated instances of minor deficiencies were found and promptly corrected by plant personnel. No violations or deviations were identified.

10. Outages (60710, 86700)

On April 10, 1988, Unit 2 shutdown to begin a scheduled 10 week refueling outage. Major activities performed during the outage included refueling with extended burnup fuel, upgrading the reactor limits computer program, overhauling the 1/2 diesel generator, test discharge of the Unit 2 125 volt and 250 volt batteries, cleaning and inspection of the 4160 volt breakers for Unit 2, remodeling the Unit 2 drywell ventilation, dredging the intake bay, erosion/corrosion inspection of the feedwater piping, inspection of the main turbine and replacement of one of the low pressure turbines, inspection of the recirculation pump MG sets and scoop-tube positioners, weld inspection of the recirculation loop risers, weld overlay of the recirculation loop end cap, repair of drywell structural steel and repair of flued head anchors. The resident inspectors monitored many of these activities, as documented in paragraph 3, Monthly Maintenance Observation, and paragraph 4, Monthly Surveillance Observation. In addition the resident inspectors personally monitored the core reload from the control room and from the refuel bridge and monitored the core reload verification from the refuel bridge.

(a) Feedwater Check Valves Fail Local Leak Rate Test

On April 13, 1988, the two feedwater check valves closest to the reactor in the B feedwater line to Unit 2, 2-220-58B and 2-220-62B, failed their local leak rate tests. These valves will be repaired during the current Unit 2 refueling outage prior to the Unit 2 primary containment integrated leak rate test.

(b) Through-Wall Crack in Unit 2 RWCU Piping

On May 4, 1988, a .9 inch long through-wall crack was discovered by ultrasonic examination in the Unit 2 reactor water cleanup (RWCU) system outlet piping on a pipe to drywell penetration weld. The licensee will complete repairs during the current Unit 2 refueling outage.

(c) Unit 2 125 Volt Battery Fails Discharge Test

On May 7, 1988, the Unit 2 125 volt battery failed its one hour discharge test. At the time of the failure Unit 1 was in cold shutdown and Unit 2 was in a refueling outage with the reactor defueled. The Unit 2 125 volt battery was placed on an equalizing charge, the jumper cables between the battery racks were replaced, and a four hour test discharge was conducted on May 13, 1988. The Unit 2 125 volt battery passed the four hour discharge test.

(d) Unit 2 Drywell Steel Connections Fail to Meet Design Requirements

On May 10, 1988, Quad Cities was informed that an engineering evaluation conducted by Sargent and Lundy determined that certain structural steel connections in the Unit 2 drywell do not meet FSAR design requirements but do meet operability requirements. The

connections will be modified during the current Unit 2 refueling outage so that they conform to FSAR design requirements.

(e) Unit 2 Reactor Scram Signal While Defueled

On May 22, 1988, with Unit 2 defueled, the Unit 2 reactor operator moved the mode selector switch from 'Refuel' to 'Startup/Hot Standby' in order to latch and then insert control rods in preparation for reloading fuel. The reactor operator moved the mode selector switch too far, activating the low condenser vacuum contact of the 'Run' modes, thus causing a low condenser vacuum scram. Since the control rods were unlatched no control rod motion occurred. The scram signal was reset and the mode selector switch was turned to the 'Refuel' position and back to the 'Startup/Hot Standby' position without any difficulty.

(f) Unit 2 RWCU Pipe Supports Do Not Meet FSAR Design Requirements

On May 24, 1988, Impell informed Quad Cities that four pipe supports on the Unit 2 reactor water cleanup system vessel bottom drain line do not meet FSAR seismic loading requirements but do meet operability requirements. The defective pipe supports will be modified to meet FSAR design requirements during the current Unit 2 refueling outage.

(g) Unit 2 Steam Jet Air Ejector Suction Butterfly Valve Improperly Installed

On May 25, 1988, the Unit 2 north steam jet air ejector suction butterfly valve 2-5401B was found to be improperly installed such that it would be open when it was required to be shut and shut when it was required to be open. The valve's disk was installed 90 degrees offset from its required position when it was installed in February 1984. Valve 2-5401B is one of a set of two butterfly valves in parallel which supply suction to the air ejector and to the mechanical vacuum pump. These parallel valves are required to automatically shut upon a high main steam line radiation signal to isolate the offgas from the environment. With improper installation, valve 2-5401B would provide a path to the environment via the mechanical vacuum pump when the mechanical vacuum pump was operating.

A similar problem occurred on Unit 1 but was discovered and corrected in 1984. Tests conducted on Unit 2 following the discovery of the problem on Unit 1 failed to detect the improperly installed butterfly valve. An incident occurred on April 3, 1988, in which these steam jet air ejector valves supposedly shut but condenser backpressure remained unaffected. This prompted the licensee to disassemble the valves, at which time the improper installation was discovered. The incident on April 3, 1988, is discussed in more detail in section 2(c) of this report.

The licensee will investigate to determine if other butterfly valves are improperly installed, and will repair valve 2-5401B during the current Unit 2 refueling outage. A more detailed discussion of the corrective action can be found in inspection reports 50-254/88011(DRS) and 50-265/88012(DRS).

(h) Control Room Ventilation Isolation

On 5/30/88 a control room ventilation isolation, reactor building ventilation isolation and standby gas treatment system automatic initiation occurred. The cause was due to a blown fuse in the Unit 2 902-40 panel. The blown fuse was replaced and the affected systems were returned to normal on 5/30/88.

(i) Spurious Group II Isolation

On 6/1/88 a partial group II isolation occurred, causing the drywell pneumatic suction valve 2-4721 and the RHR isolation valve to radwaste 2-1001-21 to shut. The partial group II isolation was due to blown fuse F-4 in panel 902-40 and blown fuse F-7 in panel 902-41. The blown fuses were replaced and the affected systems returned to normal.

11. 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 June 3, 1988, and summarized the scope and findings of the inspection activities.

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/processes as proprietary.