

U.S. NUCLEAR REGULATORY COMMISSION
REGION III

Reports No. 50-254/87002(DRP); 50-265/87002(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: November 30, 1986 through January 31, 1987

Inspector: A. D. Morrongiello

Approved By: *M. A. Ring*
M. A. Ring, Chief
Projects Section IC

2/9/87
Date

Inspection Summary

Inspection on November 30, 1986 through January 31, 1987 (Reports No. 254/87002(DRP); 50-265/87002(DRP))

Areas Inspected: Routine, unannounced inspection by the resident inspector of actions on previous inspection findings; operations; radiological controls; emergency preparedness; security; refueling/outages; quality assurance; quality control; administration; routine reports; LER review; regional requests; training; and independent inspection.

Results: One violation was identified in one area (Failure to follow procedure - Paragraph 1.f(1)(g)). No violations were identified in the remaining areas inspected. The violation is considered significant in that it resulted in a reactor scram on low condenser vacuum.

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DETAILS

1. Persons Contacted

- *R. Bax, Plant Manager
- T. Tamlyn, Production Superintendent
- T. Lihou, Operating Engineer
- *R. Robey, Technical Services Superintendent
- *M. Kooi, Compliance Coordinator
- *D. Gibson, Quality Assurance

*Denotes those present at the exit interview on January 30, 1987.

The inspectors, through direct observation, discussions with licensee personnel, and review of applicable records and logs, examined the areas stated in the inspection summary and accomplished the following inspection modules.

37700	Design Changes and Modifications
42700	Procedure Review
60710	Refueling Activities
61726	Monthly Surveillance Observations
62703	Monthly Maintenance Observations
71707	Operational Safety Verification
71710	ESF System Walkdown
81072	Access Control - Packages
90713	Review of Periodic and Special Reports
92700	Onsite Review of LERs
92701	Followup - Information Notices, Part 21 Notices
92702	Followup - Violations
92705	Followup - Regional Requests
93702	Onsite Followup of Events
92703	Followup - Confirmatory Action Letters

The inspector 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 and logs 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.

Further, additional observations were made in the following areas:

a. Action on Previous Items

(Closed) Violation 254/86002-02(DRP): This violation represented a repeat event, specifically failing to report a reactor scram that was not pre-planned. Discussions were held with the licensee to clarify the meaning of "pre-planned sequence of events."

No further actions are needed.

b. Operations

(1) Unit 1

At the beginning of the inspection period Unit 1 was at full power. At various times during this period the unit operated on Economic Generation Control (EGC).

On December 5, at 1800 hours, a unit shutdown commenced to upgrade certain drywell splices to meet Environmental Qualification (EQ) standards. On December 9, during startup, the unit scrambled on low condensor vacuum (see LER 86038 this report).

At 1345 on December 28, 1986, a drywell high level alarm was received on Unit 1. At 1456 hours 650 gallons were pumped from the drywell, corresponding to a leak rate of approximately 12 gpm, which exceeded the 5 gpm limit for unidentified leakage of reactor coolant into primary containment specified in Technical Specification 3.6.D.1.

At 1505 an Unusual Event was declared and a load reduction was initiated to comply with the Technical Specification Action statement to place the unit in cold shutdown within 24 hours. At 1550 the ENS notification was made to NRC headquarters.

At 1607 the Resident Inspector was notified. At 2130 the source of the drywell leakage was discovered to be Reactor Building Closed Cooling Water leaking from the 1F Drywell cooler. At 2330 the closed cooling water to the 1F Drywell cooler was isolated, restoring the drywell leakage to approximately 1 gpm. The Unusual Event was terminated at this time.

For the remainder of the report period the unit was either at full power or on EGC.

(2) Unit 2

One scram occurred during the portion of this report period in which the unit was in a refueling outage and is discussed in the outage section of this report.

On January 22 at 0615 the Unit 2 mode switch was placed in Run ending the refueling outage that commenced on October 11, 1986.

On January 22, 1987, at 0905 hours Unit 2's Reactor Core Isolation Cooling (RCIC) was declared inoperable due to an oil distribution problem discovered during startup testing. Unit 2's High Pressure Coolant Injection (HPCI) successfully passed its Technical Specification operability test at 0700 hours. The Unit entered into a seven day Limiting Condition for Operation (LCO) due to RCIC being inoperable. Additionally, the Unit began a shutdown on January 23 at 1030 hours due to increasing reactor water conductivity. Leaking main condenser tubes were plugged. RCIC was repaired by providing a larger return line to the oil pump suction and repositioning a thermocouple in the return line for one of the bearings. The unit went critical at 2052 on January 25, 1987.

RCIC was again declared inoperable at 0350 hours on January 26, 1987, because the oil slinger ring was not moving and proper oil volume in the outboard bearing was not achieved. HPCI successfully passed its Technical Specification operability test at 0715 hours. The RCIC outboard bearing and slinger ring were replaced and the orifice to the bearing was cleaned.

On January 26, at 1935 hours, RCIC successfully passed its Technical Specification operability test. At 2030 hours, HPCI was removed from service for an INPO recommended fast start injection test. Prior to this the relief valves for auto blowdown were successfully tested. On January 27, at 0135 HPCI failed this special test due to a faulty relay. The relay, which worked intermittently, would, when working correctly, allow the Motor Speed Changer (MSC) to move to the High Speed Stop (HSS). The problem with the relay was traced to two contacts not making up. The relay pickup voltage and those contacts were readjusted. HPCI successfully passed a post-maintenance test and an overspeed test. The special fast start test was repeated and was successfully performed and HPCI was declared operable according to Technical Specifications at 1515 hours. At 1926 hours RCIC was manually initiated for a special fast start test (also an INPO recommendation). RCIC achieved rated flow at design pressure in 31.9 seconds. This is 1.9 seconds longer than the manufacturer's design specification stated in the FSAR. RCIC was declared inoperable. RCIC's purpose is to provide cooling water to the reactor core when the reactor is isolated from the main condenser coincidentally with a loss of the reactor feedwater system. It can be started manually or automatically (along with HPCI) on a low-low water level in the reactor. Credit for RCIC is not given in the mitigation of design basis accidents and when RCIC auto initiates HPCI also initiates and provides a few of at least 5000 gpm. At 2041 hours, after adjusting the governor valve, RCIC met the test criteria with a time of

27.3 seconds. At 2330 hours, RCIC Technical Specification operability tests were completed and RCIC as declared operable. The modification of RCIC will be tracked as an Open Item (254/87002-02(DRP) and 265/87002-01(DRP)). The unit went to approximately 50 percent power and completed the startup test program. For the remainder of the report period the unit was at full power or on E.G.C.

(3) Both

During plant tours of Units 1 and 2, the inspector walked down the accessible portions of the Standby Liquid Control System and performed the applicable portions of the Inspection Procedure 71710 "ESF System Walkdown."

No violations or deviations were identified.

c. Outages

(1) Unit 1

On December 5, 1986, the unit shutdown for a planned unit outage to upgrade drywell penetration splices to EQ standards (see LER 86037 this report).

(2) Unit 2

On December 19, 1986, while performing trip checks on the Bus 23-1 to TR28 breaker, Unit 2 scrambled. The cause of the scram was the opening of the Bus 29 to Bus 28 crosstie breaker. This breaker opened when the trip test was performed and functioned as expected, i.e. it prevents parallel feeding of Bus 28 by Bus 23-1 and 24-1. The scram signals were Loss of RPS (Reactor Protection System) to trip Channel A and B, and D Main Steam Line Monitors going downscale to trip Channel B. (The ESS feeding "B" and "D" Main Steam Line Monitor was also fed from Bus 28 during this event). This electrical lineup was established due to maintenance work on Bus 23 and is not a typical lineup. Unit 2 is in a refueling outage.

(3) Both

This outage represented a marked improvement in licensee performance compared to previous outages. It was conducted with fewer errors and fewer Essential Safety Features (ESF) actuations than previous outages. Several areas, however, could use improvement. For example, the areas of communications and coordination have been discussed with the licensee. The licensee has already initiated actions to achieve better performance in the areas mentioned.

No violations or deviations were identified.

d. Maintenance

The following maintenance activities were observed/reviewed:

- (1) Observed Electrical Maintenance personnel performing EQ inspection on 4Kv breakers on Unit 2.
- (2) Observed Instrument Maintenance personnel calibrating Main Steam Pressure Sensor on Unit 2.

No violations or deviations were identified.

e. Surveillance

The following surveillance activities were observed/reviewed:

- (1) Observed portions of Unit 1 startup after EQ Outage (rod pulls, turbine warming, and start of Reactor Feed Pump).
- (2) Observed portions of Emergency Core Cooling System Test.
- (3) Observed portions of RCIC and HPCI tests during Unit 2's startup.
- (4) Observed synchronizing Unit 2 generator to the grid.
- (5) Observed portions of rod scram timing on Unit 2.
- (6) Observed testing of Automatic Depressurization System on Unit 2.

No violations or deviations were identified.

f. LER Review

(1) Unit 1

- (a) (Open) LER 86032, Revision 00: Underexcitation Relay Causes Trip of 1/2 Diesel Generator When Starting RHR Pump.

On November 8, 1986, Units 1 and 2 were both in the SHUTDOWN mode of operation. Due to a modification being installed in the station electrical switchyard, Transformer 12 (Unit 1 reserve auxiliary transformer) had to be isolated and removed from service. At 0408 hours the 1/2 Diesel Generator (DG) was started and loaded to Bus 13-1 to provide power to Unit 1 during the modification work. Subsequently the 1A Residual Heat Removal (RHR) pump was started to provide shutdown cooling flow to the Unit 1 reactor. This resulted in the 1/2 DG feed breaker to Bus 13-1 tripping, causing a loss of power to Bus 13-1 and associated Reactor Protection System Bus A which resulted in closure of a portion of the Group II isolation valves due to a loss of control power.

This event was determined to be caused by the trip of the underexcitation relay. It was subsequently disarmed and the 1/2 DG did not trip when the sequence of events was repeated.

This event is still under investigation by the System Planning Department because the relay was determined to be not out of calibration and its circuitry was also correct.

This LER will remain Open pending submittal of a supplementary LER.

- (b) (Closed) LER 86034, Revision 00: Failure of 1-2301-5 Valve Packing Causing HPCI to be Declared Inoperable.

On November 17, 1986, at 2045 hours, Unit 1 was in the "RUN" mode at 70 percent of rated core thermal power. An Equipment Attendant (EA) on routine rounds discovered a severe packing leak on the High Pressure Coolant Injection (HPCI) system 1-2301-5 motor operated valve. This valve is a normally open steam isolation valve designed to close under Group IV isolation conditions (High Steam Flow, High Area Temperature, and Low Reactor Pressure).

The 2301-5 valve was immediately isolated and taken out of service for repairs. This caused HPCI to be inoperable.

While HPCI was inoperable to repair the packing leak on steam supply valve 2301-5, the LPCI mode of RHR, both Core Spray subsystems, and the RCIC system were all proven operable.

Appropriate NRC notification was made at 2155 hours to satisfy the requirements of 10 CFR 50.72.

No further actions are necessary.

- (c) (Closed) LER 86028, Revision 00 and 01: Unit 1 Reactor Core Isolation Cooling Trip Throttle Valve Tripped Closed.

On October 3, 1986, at 1055 hours, Unit 1 was in the RUN mode at 79 percent of rated power. At this time, the Unit 1 Reactor Core Isolation Cooling (RCIC) turbine trip throttle valve tripped closed, and therefore RCIC was declared inoperable. Operating personnel sent to investigate the problem could not determine the exact cause for the valve tripping closed. The only activity in progress at the time was the performance of HPCI system operability tests.

It should be noted that when the RCIC trip throttle valve tripped the HPCI Flow Rate Testing Surveillance (QOS 2300-S1) was in progress. This surveillance requires vibration monitoring of the HPCI system. All vibration readings were within the acceptable range.

Although this is considered to be an isolated event, the trip throttle valve latching procedure was discussed in the weekly operator meeting on October 23, 1986, and will also be emphasized in the 1987 Equipment Operator (EO) and Equipment Attendant (EA) requalification training.

It should be noted that HPCI was run several times prior to and subsequent to this event with no adverse effects on RCIC.

No further actions are necessary.

- (d) (Closed) LER 86033, Revision 00: Control Room Panels - Inadequate Mounting.

This was followed by a regional based inspector and closed in Inspection Report 254/86019 (DRS).

No further actions are necessary.

- (e) (Closed) LER 86037, Revision 00: Drywell Penetration Butt Splices Failed to Remain Intact While Undergoing Qualification Testing.

On December 5, 1986, Unit 1 was in the RUN mode at 100 percent core thermal power and Unit 2 was in the REFUEL mode for a refueling outage. At 1415 hours, the station was notified that during qualification testing performed by Wyle Laboratories, the drywell penetration butt splices failed to remain intact. The testing was intended to verify that the butt splices were adequate on Unit 1 until its next scheduled refueling outage. Upon failure of the qualification testing, Unit 1 began shutting down and appropriate notifications were made. At 0910 hours on December 6, 1986 cold shutdown was reached on Unit 1.

The unqualified drywell penetration butt splices of both units were taped over per QMP 100-60 (Scotch Brands Tapes E.Q. Installation Instructions). This type of tape splices has been demonstrated to be capable of withstanding a simulated LOCA at Wyle Laboratories.

A region based inspector reviewed the licensee's procedure for taping these splices. While this LER is closed, a Part 21 Report is being tracked by DRS as an Unresolved Item.

No further actions are necessary regarding this LER.

- (f) (Closed) LER 86036, Revision 00: Gaseous Effluent Particulate Samples Lost by Offsite Laboratory.

The July, 1986, monthly particulate samples for the Main Chimney and the Unit 1 and Unit 2 Reactor Vent Systems were lost. The samples were collected and sent to Teledyne Isotopes - Midwest Facility to be analyzed. When the results for the month of July were not reported in a timely manner, Teledyne Isotopes was contacted. The inquiry revealed that they could not locate the particulate samples. The missing data was projected by averaging recent sample results. Based on operating conditions, and review of noble gas, iodine and particulate effluent releases for the previous month there was no reason to assume a large increase in particulate effluent activity.

The corporate group at Nuclear Services Technical, which sets up vendor services, has been informed of this event.

This group will review bid proposals for offsite laboratory analysis and will require that the vendor have implemented a program to track samples.

No further action is needed.

- (g) (Open) LER 86038, Revision 00: Low Vacuum Scram During Startup Due to Personnel Error.

On December 9, 1986, Unit One was in the process of starting up per QGP 1-1, Normal Unit Startup. At 1733 hours, the reactor scrambled due to low condensor vacuum. All other systems functioned as expected during this event and release rates were within Technical Specifications. The reason for condensor low vacuum was that the primary steam jet air ejectors were not valved in. The ejectors were not valved in due to personnel error. Specifically, QGP 1-1 refers to QOP 5400-1, "Offgas System Startup," which requires lineup of the primary steam jet air ejectors at 400 psig reactor pressure. This step was not performed. This LER will remain Open pending implementation of the licensee's corrective actions.

Failure to adhere to the procedures for unit startup and offgas lineup is considered to be a violation as noted in the Appendix (254/87002-01(DRP)).

(2) Unit Two

- (a) (Closed) LER 86018, Revision 00: Engineered Safety Feature Actuation Due to Radiographic Testing.

On November 13, 1986, Unit 2 was shut down for the end of cycle eight Refueling and Maintenance outage. At 1645 hours, the A & B Reactor Buildings Ventilation (RBV) system radiation monitor tripped on a high radiation level of 4 milliroentgen (mR) per hour. This closed the RBV exhaust

dampers, initiated the B Standby Gas Treatment (SBGT) system, and caused the control room ventilation to go on 100 percent recirculation, as designed.

The root cause of this occurrence is that it was not anticipated that the radiography on the SBLC system would trip the RBV radiation monitors located in the Turbine Building. As required by station procedure QAP 900-5 (In-Plant Radiography - Required Notifications and Actions) the radiographer notified the appropriate station personnel of the impending X-rays. The RBV radiation monitors are located in the Turbine Building, and the Shift Engineer did not reasonably anticipate the X-ray radiation would penetrate the thick concrete common wall between the Reactor and Turbine Buildings to such a degree that it would cause the RBV radiation monitors to trip.

It should be noted that radiography of welds on the SBLC had been accomplished earlier in the week without any ESF actuations.

No further actions are required.

- (b) (Closed) LER 86017, Revision 00: Linear Indication on Reactor Recirculation System Weld.

On October 11, 1986, Quad Cities Unit 2 was shutdown for refueling. On November 5, visual inspection revealed a Recirculation weld area with water seeping from a small crack. The cause of this occurrence is postulated as being intergranular stress corrosion cracking. A supplemental report will be submitted when all inspections and repairs have been completed.

This issue was tracked by regional based inspectors and was closed in Inspection Report 254/86019(DRS) and 265/86014(DRS).

g. Review of Routine and Special Reports

The inspector reviewed the monthly performance report for the month of December.

No violations or deviations were identified.

h. Part 21 Followup

- (1) A Part 21 report was issued by Valcor Engineering regarding the failure of 17-7 stainless steel springs in Valcor valves due to hydrogen embrittlement. The licensee was informed of this notification. Through a search of purchase orders and stockroom inventory, it was concluded that said valves

are not in use at the Quad Cities site. This also closes out IE Information Notice No. 86-72: "Failure of 17-7 Ph Stainless Steel Springs in Valcor Valves due to Hydrogen Embrittlement."

No further actions are necessary.

- (2) A Part 21 was issued by Commonwealth Edison regarding the qualification of AMP Butt splices. In order to address a deficiency identified during an EQ Audit of Dresden Station by NRC (see Inspection Reports 237/86013 and 249/86015) splices taken from Quad Cities were sent to Wyle Labs for additional EQ tests. The results of these tests indicated that the splices were not EQ.

Corrective action at Quad Cities consisted of shutting down Unit 1 (Unit 2 was in a Refueling Outage) and repairing the splices in both units using EQ qualified materials.

This item is being tracked by the Division of Reactor Safety as an Unresolved Item.

i. Regional Request

The licensee was notified about a valve related problem that occurred at Pennsylvania Power and Light's Susquehanna Plant. They discovered that Houghto #620 lubricant attacked and degraded aluminum in valves manufactured by Automatic Valve Corporation. This problem was pointed out by Quality Control and that lubricant is not used at Quad Cities.

In response to the General Electric Service Information letter (SIL) 445 entitled "Intermediate Range Monitor (IRM) Fuse Failure, the licensee conducted special tests which showed that if that fuse were blown two annunciators functioned to alert operators of a malfunction in the IRM circuitry (documented in Inspection Report 254/86013(DRP) and 265/86012(DRP)). At Quad Cities there does not appear to be a problem of minor voltage surges causing unnecessary or excessive fuse failures. Since there have been very few cases of power supply fuse failures over the life of the plant, the licensee did not upgrade the size of the power supply fuse.

No further actions are necessary.

j. IE Information Notice Followup

(Closed) IE Information Notice No. 86-99: Degradation of Steel Containments.

In November, 1986, Oyster Creek discovered some erosion of their Mark I containment drywell. In response to this concern Quad Cities inspected the drywells of both units. The drywell thickness was measured in eight locations and at each location at least three areas

were checked by ultrasonic testing (UT) performed by certified Level II UT inspectors. No thinning degradation was detected on either unit. These results were discussed with a Region based inspector who normally reviews NDE related work at this site. The licensee is aware that a Bulletin or Generic Letter may be issued on this subject and that further analysis may be required.

No further actions are necessary.

k. Procedure Review

The following procedures were reviewed.

QEP 310-T3, Prioritized Notification Listing.

QEP 310-1, Initial Notification.

QEP 310-T7, Simplified Emergency Notification Schedule for Site Emergency.

QEP 310-T8, Simplified Emergency Notification Schedule for General Emergency.

QEP 530-S2, Monthly Test of the NRC Health Physics Network.

QMP 100-3, Fire Prevention for Welding and Cutting.

QIP 100-12, Backfilling Reactor Instruments Sensing Lines.

No violations or deviations were identified.

l. Independent Inspection

Shortly after the incident at Surry Nuclear Power Station, Commonwealth Edison commissioned Nutech to select portions of piping between the condensate booster pump and the feedwater check valves to be examined for erosion/corrosion wall thinning. Sample locations were selected according to piping geometry, flow, and usage factor. All piping inspected satisfied code design requirements (ANSI/ASME B31.1-80).

Additionally it should be noted that Commonwealth Edison initiated an Action Item Request in August, 1986 to identify water lines that are vulnerable to erosion in order to start an inspection program of these lines.

No violations or deviations were identified.

m. Confirmatory Action Letter Followup

A confirmatory action letter was issued to Quad Cities after results from an NRC administered requalification program for licensed operators determined that the Quad Cities requalification program was unsatisfactory. As of February 28, 1987, a licensed SRO advisor will no longer be required since all shift assignments will be filled by license holders who have passed one of the recent NRC administered requalification exams, or who had passed an NRC license exam since October 1, 1985, or who have passed an accelerated requalification program for people who have not passed a recent NRC administered requalification exam or passed an NRC license exam since October 1, 1985. On January 16, 1987, the licensee met with the Regional Staff to discuss plans for implementing the long term requalification improvement program. While agreement was reached on the direction this program should take, this letter will remain Open pending implementation of the program and a satisfactory rating of the requalification program by DRS.

No violations or deviations were identified.

2. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspectors, and which involve some action on the part of the NRC of licensee or both. The open item disclosed during the inspection is discussed in Paragraph 1.b.

3. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Two unresolved items are discussed in this report in Paragraphs 1.h and 1.f.(1)(e). Both of these items are discussed further in reports by the Division of Reactor Safety.

4. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) throughout the inspection period and at the conclusion of the inspection on January 30, 1987, and summarized the scope and findings of the inspection activities.

The inspector 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.