

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-254/91024 (DRP); 50-265/91020 (DRP)

Docket Nos. 50-254; 50-265

License Nos. DPR-29; DPR-30

Licensee: Commonwealth Edison Company  
Opus West III  
1400 Opus Place  
Downers Grove, IL 60515


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

Inspection At: Quad Cities Site, Cordova, Illinois

Inspection Conducted: November 24, 1991, through January 4, 1992

Inspectors: T. Taylor  
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Approved By:

  
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Reactor Projects Section 1B

1/24/92  
Date

Inspection Summary

Inspection from November 24, 1991, through January 4, 1992 (Report Nos. 50-254/91024 (DRP); 50-265/91020 (DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident and regional inspectors of licensee activities concerning operational safety verification; monthly maintenance observation; monthly surveillance observation; training effectiveness; report review; events; and other activities.

Results: Of the seven areas inspected, no violations were identified in five. In the two remaining areas, three violations were identified: (1) failure to report to the NRC in paragraph 2.a, (2) failure to adhere to the radiological control procedure for wearing electronic dosimeters in paragraph 2.c, and (3) inadequate procedures in paragraphs 7.a and b.

## EXECUTIVE SUMMARY

### Plant Operation

Unit operations for the report period were considered mixed. On December 11, 1991, an automatic scram occurred on Unit 1 due to a turbine trip from high reactor vessel level caused by failure of the 1A feedwater regulating valve. On December 16, 1991, an Unusual Event (UE) was declared for Unit 1 due to a Technical Specification (TS) required shutdown. Water impingement required de-energization of bus 14-1, initiating the TS required action. During both events, operations crews performed well. Two examples of a violation were identified concerning inadequate instructions for out-of-service activities. A violation was also identified for two instances of failure to make 10 CFR 50.73 reports to the NRC regarding reactor core isolation cooling (RCIC) system pump discharge valve failures.

### Radiological Controls

One violation with multiple examples was identified concerning control of personnel electronic dosimetry. Management was not adequately informed to ensure that the occurrences were properly evaluated to effect problem resolution. One open item was identified concerning a possible program weakness relating to lack of guidance for tracking discrepancies associated with electronic dosimeters.

### Maintenance

Overall maintenance activities showed a steady performance. One open item was identified concerning feedwater regulating valve maintenance intervals.

## DETAILS

### 1. Persons Contacted

#### Commonwealth Edison Company (CECo)

- \*R. L. Bax, Station Manager
- G. C. Tietz, Technical Superintendent
- \*G. F. Spedl, Production Superintendent
- \*B. Strub, Assistant Superintendent - Operations
- R. Stols, Superintendent of Programs
- \*J. Sirovy, Services Director
- \*T. Tamlyn, Engineering and Nuclear Construction Site Manager
- \*D. Craddick, Assistant Superintendent - Maintenance
- J. Kopacz, Operating Engineer - Unit 2
- \*A. Misak, Regulatory Assurance Supervisor
- C. Smith, Nuclear Quality Program Supervisor
- K. Leech, Security Administrator
- B. McGaffigan, Assistant Superintendent - Work Planning
- \*D. Kanakares, Regulatory Assurance
- \*J. A. Neal, On-Site Nuclear Safety Group Administrator

\*Denotes those attending the exit interview conducted on January 6, 1992, and at other times throughout the inspection period.

The inspectors also talked with and interviewed several other licensee employees, including members of the technical and engineering staffs, reactor and equipment operators; shift engineers and foremen; electrical, mechanical, and instrument maintenance personnel; and contract security personnel.

### 2. Operational Safety Verification (71707)

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, interviews and discussions with licensee personnel, independent verification of safety system status and review of facility records.

On a sampling basis the inspectors daily verified: control room staffing and coordination of plant activities with ongoing control room operations; operator adherence with approved procedures; operation as required by Technical Specifications (TS); monitoring of control room instrumentation for abnormalities; that onsite and offsite power was available; plant and control room visits were made by station managers; and safety parameter display system (SPDS) operation.

During tours of accessible areas of the plant, the inspectors made note of general plant/equipment conditions, including control of activities in progress (maintenance/surveillance), observation of shift turnovers, general safety items, etc. The specific issues or areas evaluated were:

a. Unreported RCIC Discharge Valve Failures

On December 1, 1991, during 250 Vdc valve stroking activities with the reactor in cold shutdown, the RCIC pump discharge valve failed to open from the control room after several attempts. The Nuclear Station Operator (NSO) then stroked the upstream pump discharge valve, which operated properly. The NSO then successfully stroked the RCIC pump discharge valve several times. The shift engineer was informed, but the valve was not declared inoperable. Electrical maintenance personnel verified proper valve motor current and observed stroking of the valve from the motor control center (MCC), but were unable to determine root cause of the previous failures. Dirty contacts were assumed to be the root cause, and the shift engineer considered the valve fully operable. The inspector later discussed the lack of root cause determination with the master electrician who then, with operations concurrence, initiated an enhanced surveillance program of the valve. The corrective action appeared adequate in the short term, with reliance on the recently implemented 250 vdc MCC preventive maintenance program to prevent recurrence in the long term. Further inspection indicated that the valve failure satisfied 30 day reporting requirements to the NRC, implemented through QCAP 1780-3. The licensee was informed of this determination by the NRC on December 19, 1991, but failed to submit the 30 day report prior to the period being exceeded. Additionally, the licensee failed to document the valve failure into any existing equipment failure tracking system. Finally, the inspector reviewed system maintenance history and noted a similar valve failure occurred on April 24, 1991. This inoperability was documented as a deviation in the licensee's system, but not reported to the NRC.

Title 10 of the Code of Federal Regulations Part 50.73(a)(2)(v) requires that any event or condition that alone could have prevented the fulfillment of the safety function of structures or systems that are needed to remove residual heat, regardless of reactor mode or power level, be reported to the NRC. This requirement is implemented by the licensee through QCAP 1780-3, revision 1, effective February 15, 1991, which describes the reporting process utilized at the station. The failure to submit the 30 day report prior to the period being exceeded for the above events is considered a violation of 10 CFR 50.73(a)(2)(V) (254/91024-01a,b(DRP)). The December 1, 1991, failure will be considered item a, with the latter example considered item b.

An apparent root cause of the violation of December, 1991 was the shift engineer's decision to not consider the RCIC pump discharge valve inoperable, when it failed to move off its seat after

several stroke attempts. Consequently, the valve inoperability was not recognized as a significant condition adverse to quality and handled through the QCAP 1780-3 reporting process.

b. Engineered Safety Features (ESF) Systems

Accessible portions of ESF systems and components were inspected to verify: valve position for proper flow path; proper alignment of power supply breakers and integrity of visible fuses; proper system actuation on an initiating signal; proper removal of power from components if required by TS or FSAR; and the operability of support systems essential to system actuation or performance through observation of instrumentation and/or proper valve alignment. The inspectors also visually inspected components for leakage, proper lubrication, cooling water supply, etc.

c. Radiation Protection Controls

The inspectors verified that workers were following health physics procedures for dosimetry, protective clothing, frisking, posting, etc., and randomly examined radiation protection instrumentation for use, operability, and calibration. One area of concern involving control of electronic dosimeters (EDs) was identified.

During NRC plant tours (November 20 and 26, 1991) and in response to NRC inquiries concerning control of EDs, four instances of improper control of EDs were identified. The EDs were found unattended and not worn on the body as required by QRP 1001-1. All radiation work permits (RWP) require the ED to be worn when working in radiological controlled areas (RCA). Additionally, Technical Specification (TS) 6.2.8 requires that radiation control procedures be maintained and adhered to. Failure to wear the ED as required is considered a violation of Technical Specification 6.2.B, (254/91024-02(DRP)).

Review of the ED issue identified a possible program weakness. The instances identified through responses to NRC inquiries were found by asking the radiation protection technicians (RPT) if they were aware of any ED problems. Discussions with RPT indicated that there is little or no guidance on handling such issues. This issue is considered an open item pending further review by Region III radiation protection inspectors (254/91024-03(DRS)).

d. Security

The inspectors, by sampling, verified that persons in the protected area (PA) displayed proper badges and had escorts if required; vital areas were kept locked and alarmed, or guards posted if required; and personnel and packages entering the PA received proper search and/or monitoring.

e. Housekeeping and Plant Cleanliness

The inspectors monitored the status of housekeeping and plant cleanliness for fire protection and protection of safety-related equipment from intrusion of foreign matter.

The inspectors also reviewed various records, such as tagouts, jumpers, shift logs and surveillances, daily orders, maintenance items, various chemistry and radiological sampling and analysis, third party review results, overtime records, QA and/or QC audit results, and postings required per 10 CFR 19.11.

Two violations and no deviations were identified.

3. Monthly Maintenance Observation (62703)

Station maintenance activities were observed and/or 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 system were removed from and restored to service; approvals were obtained prior to initiating the work; functional testing and/or calibrations were performed prior to returning components or systems to service; activities were accomplished by qualified personnel; and proper radiological and fire prevention controls were implemented.

The following maintenance activities were observed and reviewed:

Unit 0

Reactor Building/Atmosphere Differential Pressure Transmitter Calibration

Unit 1

Bus 14-1 Diesel Generator Switchgear Troubleshooting  
Torus/Drywell Purge Fan Filter Preventive Maintenance  
RCIC Pump Discharge Valve (1-1301-49) Troubleshooting

Unit 1A Air-Operated Feedwater Regulating Valve (FRV) Failure

At 12:50 a.m. on December 11, 1991, Unit 1 load was reduced to 650 MWe. During the load reduction, 1A FRV would not close to less than 34% open from the control room. At 4:15 a.m., equipment attendants and 2 shift foremen took local manual control and attempted to close the valve. At 25% closed by local indication, the valve manual actuator failed, causing the valve to go full open. Reactor vessel level subsequently increased, resulting in a turbine trip and subsequent reactor scram, Group II and III



isolation, and spurious Group I isolation signals. The control room operators responded well to the event.

Disassembly of the FRV after the failure indicated wear on the A0 stem and the A0 internal stem bushing. Also, wear was found on the valve stem and valve bonnet. This wear was determined to have been caused by the A0 not being directly centered over the valve, thus pulling the stems to one side. The manual actuator breaking was caused by personnel over-stressing the actuator when attempting to close the valve which was binding. Based on discussion with operating personnel, the valve had been known to stick during other load changes. The last maintenance activity on this valve was in December of 1987. Corrective actions for this event included suspension of manual valve manipulation until further evaluation and consideration of instituting a preventative maintenance program. The length of time between maintenance intervals and deterioration of the valve suggest a more timely maintenance interval would be appropriate. This is considered an open item pending further review (254/91024-04(DRP)).

The inspector has no further concerns with this event.

#### Unit 2

Torus/Drywell Purge Fan Filter Preventive Maintenance

No violations or deviations were identified.

#### 4. Monthly Surveillance Observation (61726)

The inspectors observed surveillance testing required by Technical Specifications during the inspection period and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that results conformed with Technical Specifications and procedure requirements and were reviewed by personnel other than the individual directing the test, and that deficiencies identified during the testing were properly resolved by the appropriate personnel.

The inspectors also witnessed portions of the following test activities:

##### Unit 1/2

QCOS 7500-5 Standby Gas Treatment System Monthly Operability Test

QOS 6600-1 Diesel Generator Monthly Load Test

##### Unit 1

QOS 6600-1 Diesel Generator Monthly Load Test

Unit 2

QCIS 100-1 Weekly Power Operations Functional Test

No violations or deviations were identified.

5. Training Effectiveness (41400, 41701)

The effectiveness of training programs for licensed and non-licensed personnel was evaluated by the inspectors, by witnessing performance of surveillance, maintenance, and operational activities. Except for violation issues noted, personnel appeared to be knowledgeable of tasks being performed. In general, activities performed indicated an effective training program.

No violations or deviations were identified.

6. Report Review

During the inspection period, the inspector reviewed the licensee's Monthly Performance Report for November 1991. The inspector confirmed that the information provided met the requirements of Technical Specification 6.9.1.8 and Regulatory Guide 1.16.

The inspector also reviewed the licensee's Monthly Plant Status Report for November 1991.

No violations or deviations were identified.

7. Events (93702)

a. Unit 2 Motor-Generator (MG) Set Deluge System Actuation

On September 22, 1991, with Unit 2 in cold shutdown, the 2B reactor recirculation system MG set tripped as a result of an inadvertent deluge system actuation. The 2A MG set was subsequently shut down to remove any potential water impingement concerns. No further concerns were identified with the 2A MG set. The 2B MG set was inspected and dried out, with insulation resistance readings indicating satisfactory. During restart of the 2B set, the motor stator faulted. This was caused by water intrusion underneath a stator winding epoxy patch repair performed in 1983, and resulted in replacement of the motor with a like component obtained from Dresden.

The actual safety significance of the event was minor, due to the reactor cold shutdown condition. However, the fire system work was classified as non-outage, and had the actuation tripped the MG set with the reactor at power, a sizable reactor transient could have occurred. The MG set trip did provide added burden to the ASOs, in that, the technical specifications required raising reactor vessel level to approximately that of the main steam lines with the reactor shutdown and recirculation system off.



Heightened operator focus on water level was required, as maintenance was being performed on the 2B main steam isolation valve. The licensee managed this activity adequately, as no level problems occurred.

The cause of the event was attributed to inadequate work instructions to perform the task. 10 CFR Part 50, Appendix B, Criterion V states, in part, that activities affecting quality shall be prescribed and accomplished in accordance with instructions of a type appropriate to the circumstances. Restoration of the fire system Multimatic valves required pre-pressurization of the latching chamber prior to pressurization of the header. The latching chamber must be pressurized to hold the valve disc closed while the header pressurizes. An adequate procedure was available to restore the system following a deluge actuation. However, the procedure did not identify planned isolation and draining of the system as a prerequisite. Had the work planning process recognized the similarity between system actuation recovery and the planned out-of-service evolution, and included the proper procedure in the work instruction, the inadvertent actuation may not have occurred. The utilization of work instructions which did not contain provisions for pre-pressurizing the Multimatic valves while returning them to service is considered a violation of 10 CFR, Part 50, Appendix B, Criterion V (254/91024-05a(DRP)). Pending corrective actions include procedure changes for repressurizing Viking and Multimatic valves, training on the procedure revisions, and tailgate sessions with all departments regarding the event.

b. Breach of Secondary Containment During Preventive Maintenance

On December 10, 1991, while performing maintenance on the unit 1A and 2A drywell to torus purge fans, the fan filter covers were removed while the fan isolation dampers were open. Since inerting of the Unit 2 primary containment was in progress, a path was created from primary and secondary containment via the isolation dampers and open fan filter covers to atmosphere. Event duration was approximately 4 hours and negative reactor building to atmosphere differential pressure was maintained. Primary containment integrity was not compromised during the event.

The cause of the event was attributed to inadequate work instructions utilized by the operations personnel while establishing the purge fan isolation boundaries. The operators had previously opened the breaker for the damper actuators, and assumed that the dampers would fail closed when electrically isolated. The operator then proceeded to lockwire the damper in the as-found configuration based on the previous assumption. System design causes the dampers to fail open under this condition. A second operator performed an independent verification of the activity, and also proceeded assuming the dampers would fail closed. The verifier was able to verify the

dampers were lockwired in the as-found condition. The maintenance mechanics later opened the fan filter covers to perform maintenance on the filter seals. The mechanics observed the fan blade "windmilling", but since this was common the mechanics did not perceive a problem. When the covers were removed from the 2A fan train, a high filter differential pressure alarm was received in the control room. Operations personnel responded to the alarm and diagnosed and corrected the breach, exhibiting questioning attitudes and good performance for this portion of the event. Due to the fact that reactor building vacuum was maintained, the safety significance of the event was minimized, however, secondary containment integrity is required with both units operating at power to mitigate the consequences of an accident, therefore, the event is considered safety significant.

10 CFR Part 50, Appendix B, Criterion V states, in part, that activities affecting quality shall be prescribed and accomplished in accordance with instructions of a type appropriate to the circumstances, which shall include acceptance criteria for determining that the activities have been satisfactorily accomplished. The procedures utilized to perform the damper isolation did not contain appropriate instructions to satisfactorily accomplish the task. The procedures contained no information to achieve or verify the proper position of the damper arms. No labeling or observation ports were available to observe damper position. Utilization of inadequate work instructions to perform an activity affecting quality and plant safety is considered a violation of 10 CFR 50, Appendix B, Criterion V (254/91024-05b(DRP)). Initial corrective actions included revision of the out-of-service procedure and enhanced management oversight of the activity.

c. Bus 14-1 De-Energization Unusual Event

On December 16, 1991, at 2:50 p.m. an unusual event (UE) was declared on Unit 1. The UE was declared in response to Unit 1 entry into Technical Specification (TS) section 3.0 and initiating the required unit shutdown. Entry into 3.0 required the unit to be in hot shutdown in 12 hours and in cold shutdown within the next 24 hours. TS 3.0 entry was required due to the de-energization of 4 kv bus 14-1. De-energizing bus 14-1 rendered the Unit 1 emergency diesel generator, 1B core spray (CS), and loop B of the residual heat removal system (RHRS) inoperable. The licensee de-energized bus 14-1 to prevent equipment damage as a result of water intrusion caused by a faulty reactor building ventilation heating system drain valve. The valve had vibrated open and was spraying water on bus 14-1. During the UE, command and control of unit operations was transferred from the shift engineer to the station director.

The electrical maintenance department inspected the bus cubicles and breakers. A small amount of water was found in three of the

cubicles. The drain valve was replaced and secured in the closed position to preclude any future problems. After subsequent breaker and system operability testing, at 4:45 a.m. on December 17, 1991, the CS and RHRS were declared operable. Upon resolution of breaker problems associated with the Unit 1 diesel and satisfactory testing, the diesel was declared operable.

A unit start-up was commenced about 4:00 p.m. on December 17. Temporary plastic splash shields were placed over the 4kv cubicles as a short term corrective action. As a result of this event, the licensee is evaluating a modification concerning permanent splash shield installation on the 4 kv electrical bus cubicles.

The resident staff is monitoring licensee activities and has no further concerns relative to this event.

One violation with two examples and no deviations were identified.

8. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed by the inspector and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 2.c and 3.0.

9. Exit Interview

The inspectors met with the licensee representatives denoted in Paragraph 1 during the inspection period and at the conclusion of the inspection on January 6, 1991. The inspectors summarized the scope and results of the inspection and discussed the likely content of this inspection report. The licensee acknowledged the information and did not indicate that any of the information disclosed during the inspection could be considered proprietary in nature.