

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/91020 (DRP); 50-265/91016 (DRP)

Docket Nos. 50-254; 50-265

Licenses No. DPR-29; DPR-30

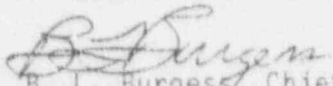
Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

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

Inspection At: Quad Cities Site, Cordova, Illinois

Inspection Conducted: September 1, 1991, through October 12, 1991

Inspectors: T. E. Taylor
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Reactor Projects Section 1B

10/30/91
Date

Inspection Summary

Inspection from September 1, 1991, through October 12, 1991
(Reports No. 50-254/910-20(DRP); 50-265/910-16(DRP))

Areas Inspected: Routine, unannounced safety inspection by the resident and regional inspectors of licensee action on previously identified items, operational safety verification, monthly maintenance observation, monthly surveillance observation, training effectiveness, report review, events, Part 21 notification, action plan follow up, and meetings.

Results: Of the areas inspected, one violation was identified concerning failure to take adequate corrective actions to preclude repetition of procedure violations concerning NSO and SCRE responsibilities. In the remaining areas no violations were identified.

EXECUTIVE SUMMARY

Plant Operation

1. Performance during this period was mixed. Operations activities and operator performance appeared to be on an improving trend until September 18, 1991, when a Unit 2 inboard main steam isolation valve (MSIV) disc separated from the stem and failed closed. The operating crew did not notice, in a timely manner, the change in reactor pressure, average power range monitor (APRM) spike, or the change in steam line flows in addition to the reduction in the B steam line. A violation was identified for inadequacy of corrective action for previous violations concerning the Nuclear Station Operator's (NSO) failure to be attentive to the control panel indications and Shift Control Room Engineer's (SCRE) failure to maintain cognizance of the unit NSO activities. Immediate corrective actions were comprehensive and appropriate.
2. Operator requalification was completed September 20, 1991. Operator performance was weak in the area of procedural tasks.
3. As of October 9, 1991, a new Assistant Superintendent of Operations was appointed. Also, temporary procedures and management memos for operators' duties concerning monitoring of control panels containing explicit instructions, logging of watch reliefs, and SCRE management responsibilities were implemented. These corrective actions were in response to operations performance related to the unit 2 inboard MSIV failure.
4. One unresolved item concerning operability of the high pressure coolant injection (HPCI) system and certain residual heat removal (RHR) pumps with inoperable room coolers was identified. The licensee has performed an analysis indicating that the systems are operable without room coolers. This item is unresolved pending NRR review of the licensee analysis.

Radiological Controls

An issue concerning a number of unlocked high radiation area doors (R-doors) and unattended R-door keys was identified. Region III inspectors are interfacing with the resident staff to address this issue.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

R. L. Bax, Station Manager
*G. C. Tietz, Technical Superintendent
*C. F. Spedl, Production Superintendent
*B. Strub, Assistant Superintendent - Operations
*R. Stols, Superintendent of Programs
J. Fish, Master Mechanic
J. Sirovy, Services Director
T. Tamlyn, Engineering and Nuclear Construction Site Manager
*D. Craddick, Assistant Superintendent - Maintenance
J. Swales, System Engineer Supervisor
J. Wethington, Assistant Tech Staff Supervisor
A. Misak, Regulatory Assurance Supervisor
R. Walsh, Technical Staff Supervisor
D. Bucknell, Assistant Technical Staff Supervisor
C. Smith, Nuclear Quality Program Supervisor
K. Leech, Security Administrator
B. McGaffigan, Assistant Superintendent - Work Planning
*A. Fuhs, Regulatory Assurance
D. Kanakares, Regulatory Assurance
*J. Morris, Nuclear Safety
D. Fisher, Nuclear Engineering Department
J. Glover, Production Services Department
J. Renwick, Special Project Manager
J. Schrage, Nuclear Licensing
T. Schuster, Nuclear Licensing
E. White, Regulatory Assurance

*Denotes those attending the exit interview conducted on October 10, 1991, 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, and electrical, mechanical, and instrument maintenance personnel, and contract security personnel.

2. Licensee Action on Previously Identified Items (92701, 92702)

- a. (Closed) Unresolved Item 254/90014-03; 265/90014-03: Limiting Conditions of Operation (LCO) and System Operability. The licensee currently enters and documents the proper LCO when performing the standby liquid control pump surveillance. Additionally, the licensee identified one other case (paragraph 6 of inspection report

254/91014) where an LCO went unrecognized, and had taken corrective action. The inspectors have identified no other LCO problems during surveillances. This item is considered closed.

- b. (Closed) Noncompliance 254/90014-02: Unauthorized Design Change. This item dealt with a modification installed in 1978 to support surveillance testing, which included a terminal strip and associated wiring connecting auxiliary contacts between divisions of emergency core cooling systems. The inspector reviewed the licensee's current modification and work request classification programs, which appeared adequate to prevent recurrence of this violation. This item is considered closed.

No violations or deviations were identified.

3. 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, tours of the facility, interviews and discussions with licensee personnel, independent verification of safety system status and limiting conditions for operation action requirements (LCOARs), corrective action, and review of facility records.

On a sampling basis, the inspectors daily verified: proper control room staffing and access, operator behavior, and coordination of plant activities with ongoing control room operations; operator adherence with the latest revisions of procedures for ongoing activities; safe operation as required by Technical Specifications (TS); engineered safety features (ESF) and ESF electrical alignment and valve positions; instrumentation recorder traces and duplicate channels for abnormalities; status of various lit annunciators for operator understanding, off-normal condition, and corrective actions being taken; nuclear instrumentation (NI) and other protection channels were operable; reviewed radiation monitors and stack monitors for abnormal conditions; that onsite and offsite power was available as required; frequency of plant/control room visits by the station manager, superintendents, assistant operations superintendent, and other managers; and that the Safety Parameter Display System (SPDS) was operable.

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 areas observed were:

a. 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 or fuses (if visible) for proper actuation on an initiating signal; proper removal of power from components if required by TS or FS; 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.

b. 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. During the report period three high radiation barriers were found unlocked and one R-door key was found unattended, lying on the MSIV room step off pad. Adequate control of R-door access is being evaluated by the NRC Region III staff.

c. 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.

d. Housekeeping and Plant Cleanliness

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

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

No violations or deviations were identified.

4. Monthly Maintenance Observation (62702)

Station maintenance activities affecting the safety-related systems and components listed below were observed/reviewed to ascertain that they

were conducted in accordance with approved procedures, regulatory guidelines and industry codes or standards, and in conformance with Technical Specifications.

The following items were considered during this review: limiting conditions for operation were met while components or systems were removed from and restored to service; approvals were obtained prior to initiating 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 the 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 and reviewed:

Unit 0

A Standby Gas Treatment System Flow Switch Repair

Unit 2

Inboard (1B) Main Steam Isolation Valve Overhaul
Outboard (2B) Main Steam Isolation Valve Inspection
2B Reactor Recirculation System Motor-Generator Set Repair

The inspectors monitored the licensee's work in progress and verified that it was being performed in accordance with proper procedures and approved work packages.

No violations or deviations were identified.

5. 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, test instrumentation was calibrated, limiting conditions for operation were met, removal and restoration of the affected components were accomplished, 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 testing were properly reviewed and resolved by appropriate management personnel.

The inspectors also witnessed portions of the following test activities:

Unit 0

QOS 6600-01, Emergency Diesel Generator Monthly Load Test

Unit 1

QIS-60, Power Operation Functional Test

QCOS 100-2, Monthly RHR Pump/ RHRSW Pump Operability Test

QCOS 1400-4, Monthly Core Spray Pump Operability Test

QCOS 1400-8, Quarterly Core Spray System Power Operated Valve Test

Unit 2

QCOS 1000-7, Cold Shutdown RHR System Valve Test

No violations or deviations were identified.

6. Training Effectiveness (41400, 41701)

The effectiveness of training programs for licensed and non-licensed personnel was reviewed by the inspectors during the witnessing of the licensee's performance of routine surveillance, maintenance, and operational activities and during the review of the licensee's response to events which occurred during the inspection period. The operator's lack of response to the MSIV failure (MSIV failed condition went unnoticed for about 3-1/2 hours) represents a significant weakness in the effectiveness of the licensee's operator training program. The licensee has committed to evaluate the program based on this weakness. The September 1991 NRC requalification exams indicated a significant weakness in the operator training program with regard to procedural tasks.

No violations or deviations were identified.

7. Report Review

During the inspection period, the inspector reviewed the licensee's Monthly Trending and Analysis Report for August 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 August 1991.

No violations or deviations were identified.

8. Events (93702)

Unit 2 B Inboard Main Steam Isolation Valve (MSIV) Failure

On September 18, 1991, at approximately 6:05 PM, the B inboard main steam isolation valve (MSIV) failed closed. The cause of the valve failure was loosening of the nuts from the bolts of the collar device which attached the stem to the valve disc. The last maintenance activity requiring valve disassembly was performed by contractors during the February 1990 refuel outage. Review of the work package found that no torque values were specified for the loosened nuts. Also, observations of the valve identified possible problems with the washer lock tab installation. The outboard MSIV on the B steam line was also disassembled and inspected. No deficiencies were identified. During the February outage, problems associated with control of contractors were identified. Subsequent licensee corrective actions appear to have resolved this issue, as evidenced by the lack of significant issues related to control of contractors identified during the spring 1991 Unit 1 refuel outage and the Unit 1 main transformer installation. One area of concern associated with the valve failure was the operations crew performance. The MSIV failure and subsequent effects on Unit 2 went undetected for about 3-1/2 hours.

At 6:05 p.m. due to the valve failure, reactor pressure went from 980 pounds per square inch (psi) to 1016 psi, the B steam line flow indication went to zero, and the APRMs spiked, indicating that reactor power went from 85% to 95% and back to 85% power. The abnormal plant parameter indications were not noticed by the operations shift until about 9:35 PM. At about 9:35 PM the APRM spike was discovered by the extra NSO performing a main steam line radiation monitor surveillance. The operations crew investigation of the APRM spike resulted in discovery of the steam line flow condition. Interviews were conducted with the unit Nuclear Station Operator (NSO), Shift Engineer (SE), extra NSO, Shift Control Room Engineer (SCRE), and operations trainees on shift. Failures to follow procedures were identified which were a failure by the unit NSO to adequately monitor key plant parameters, and a failure by the SCRE to control unit activities and be cognizant of unit status to assure the unit was maintained in a safe operating condition. Previous to this event, procedural violations for failure by the NSOs to adequately monitor control panel indications and failure by the SCRE to be cognizant of unit status and control room activities so as to assure safe plant operation were issued as parts of aggregate violations in inspection reports 50-254/91006 and 50-265/90020. Failure to take adequate corrective action to prevent repetition of these items is considered a violation of 10 CFR, Part 50, Appendix B, criterion, XVI. (50-265/91020-01)

Prior to this event operations department performance was viewed as improving. As a result of this event, operations performance is considered improved when compared to previous operating history, but not on an improving trend. The licensee has taken immediate corrective measures which include more management overview of shift operations,

administrative requirements for logging plant parameters, logging intershift watch reliefs, guidelines for control panel monitoring, repeat back requirements, and guidelines concerning management expectations for the NSD and SCRE responsibilities.

Emergency Core Cooling System (ECCS) Room Coolers Followup

The inspector reviewed the licensee's 10 CFR 50.59 evaluation concerning the re-classification of certain emergency core cooling system room coolers as non-attendant equipment for system operability. The safety evaluation was based on a study of ECCS room thermal loading during a loss of cooling accident performed by Nuclear Fuel Services (NFS) (licensee off-site engineering group). The application of the 50.59 criteria appeared adequate. The inspectors have forwarded the NFS documentation to NRR for further technical review. This issue is considered unresolved pending NRR review of the NFS analysis. (254/91020-02, 265/91016-02)

9. Action Plan Followup

3.1.b.(1).a and b, Contractors

Many examples of inadequate control of contractor work practices were identified during the Unit 1 refuel outage of October 1989. Subsequent corrective actions have been implemented. For the February 1991, Unit 2 refuel outage and the August 1991, main transformer outage contractor work practices were monitored. No significant examples of inadequate contractor control were identified. This issue is considered closed.

2.1.e Shift Briefs Were Unstructured

The operations shift briefs were very informal and problems with adequate information exchange and communication were identified. The licensee focused management attention to this issue. Shift briefs are now structured. The briefs are held outside the control room, are attended by representatives from all appropriate station departments, have a structured format, and exhibit adequate information exchange and shift communication. These shift briefs are considered adequate. This issue is closed.

3.1.b(2)a Station Maintenance

Maintenance management involvement in ongoing work activities was occasionally weak. Management is now more involved in overview of maintenance activities. The Assistant Superintendent of Maintenance, on a weekly basis, reviews and observes in-plant work activities. Additionally, the Master Mechanics are more involved in work activities and have a better knowledge of job status. This item is considered closed.

4.1.a Engineering and Support Issues

Excessive technical staff workload and personnel turnover problems were observed. Licensee resources for the technical staff have been increased. A number of engineers have been hired. The workload is now more evenly distributed. In 1991 only one engineer left Quad Cities. The system engineer group has been expanded and a dedicated modification group has been formed. This issue is considered closed.

10. Licensee 10 CFR Part 21 Notification

During the performance of the Unit 1 containment integrated leak rate test on February 28, 1991, the two-ply flexible metallic bellows in mechanical penetration X-25 (drywell 18" exhaust line) developed numerous cracks. The bellows was replaced with a like-for-like unit. On March 27, 1991, the licensee submitted a Part 21 notification regarding the untestability, as required by 10 CFR 50, Appendix J, of certain two-ply bellows. The notification was applicable to the Dresden and Quad Cities units, and involved a total of 88 containment penetrations.

During an inspection at the licensee's corporate engineering office, performed on October 1, 1991, the following additional information was obtained:

- a. Bellows are not used at any containment penetration for LaSalle, Zion, Byron, or Braidwood.
- b. An air leakage rate of 0.5 scfh, during air testing at Pa, was used to trigger additional testing using undiluted helium. The helium test, also at Pa, was sensitive enough to determine whether leakage existed thru either ply, provided that the helium background was not excessive.
- c. The leakage rate can not be quantified. As a result, an exemption from the requirements of 10 CFR Part 50, Appendix J would be needed. The licensee had not yet submitted the exemption request.
- d. Plans called for the replacement of one bellows per unit per fuel cycle. The new bellows, with a gap between plies of approximately 3/4" will be Type B testable. In the past, the criteria for bellows replacement was a leakage rate of 12 scfh.
- e. Type A testing to demonstrate containment integrity will have to be performed every refueling outage until either all bellows are replaced with testable ones, a method to perform acceptable Type B testing on the present bellows is developed, or an exemption from the testing requirements of Appendix J to 10 CFR Part 50 is obtained.

11. Site Visits by NRC Staff

Bert Davis, Region III Regional Administrator, visited Quad Cities Station on September 13, 1991. Mr. Davis reviewed resident staff activities and briefly met with the plant manager and Performance Enhancement Program coordinator.

12. 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 October 10, 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.