U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/92011 (DRP); 50-265/92011 (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: March 31, 1992 through May 4, 1992

Inspectors: T. E. Taylor
J. M. Shine
P. Prescott

Approved By: R. C. Knop, Chief 5/14/92
Reactor Projects Section 1B Date

Inspection Summary

Inspection from March 31, 1992, through May 4, 1992 (Report Nos. 50-254/92011(DRP); 50-265/92011(DRP))

Areas Inspected: A routine, unannounced safety inspection was conducted by the resident inspectors of licensee action on previously identified items; regional requests; operational safety verification; monthly maintenance observation; monthly surveillance observation; evaluation of power reactor exercise; training effectiveness; report review; events; and meetings and other activities.

Results: One violation with two examples was identified and is discussed in Section 10. In the remaining areas no violations or deviations were identified.

EXECUTIVE SUMMARY

Plant Operation

One violation concerning exceeding TS temperature limits of figure 3.6-1 during the Unit 2 10 year hydro test was identified. The apparent cause was a poor test procedure and a lack of attention to detail concerning test temperature parameters. Operator performance during the period was considered very good. During two loss of annunciator and one loss of offsite power events, operators took prompt and appropriate actions to maintain the unit in a stable condition. Operator performance observed during the GSEP drill appeared adequate to mitigate the simulated casualty.

Maintenance and Surveillance

One violation concerning inadequate instructions for a February 1991 HPCI stop valve repair was identified. This item surfaced during the February 1992 AIT review of a scram event. The first successful as-found primary containment integrated leak rate test has been completed. The Division of Reactor Safety is reviewing the results. Work activity during the refuel outage included undervoltage modifications on Unit 2. Interim compensatory measures for Unit 1 are in place. The Unit 1 modifications are scheduled for the next Unit 1 refuel outage in September 1992.

Engineering and Technical Support

An issue involving limber yokes for residual heat removal system (RHR) heat exchanger bypass and torus suction valves, and the core spray suction valves was identified during Mark 1 event engineering evaluations. The valve yokes were found to be outside the FSAR allowable design limits, but are considered operable. The Region III Division of Reactor Safety is reviewing the issue.

Emergency Preparedness

Apparent weaknesses were identified during the GSEP drill of April 29, 1992. These included issues in the areas of event classification and timely notification of offsite agencies.

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, Supervisor of Programs
J. Fish, Master Mechanic
J. Sirovy, Services Director
*T. Tamlyn, Engineering and Nuclear Construction Site Manager
D. Craddick, Assistant Superintendent - Maintenance
B. Tubbs, Operating Engineer - Unit 1
J. Kopacz, Operating Engineer - Unit 2
J. Wethington, Assistant Tech Staff Supervisor
D. Bucknell, Assistant Technical Staff Supervisor
A. Misak, Regulatory Assurance Supervisor
R. Walsh, Technical Staff Supervisor
C. Smith, Nuclear Quality Program Supervisor
K. Leech, Security Administrator
B. McGaffigan, Assistant Superintendent - Work Planning
J. Hoeller, Training Supervisor
*D. Kanakares, Regulatory Assurance
*J. Morris, Onsite Nuclear Safety

*Denotes those attending the exit interview conducted on May 4, 1992.

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

(Closed) Unresolved Item (254/92003-01(DRP)): New fuel bundle mispositioning error. This item dealt with the misplacement of nine unirradiated fuel bundles within the spent fuel pool, which occurred on January 24, 1992. The inspector reviewed actions of personnel leading to the communication breakdown to ascertain that they were conducted in accordance with approved procedures. Final review indicated that procedural adherence by fuel handling personnel was adequate, in that operations shift supervisor authorization was obtained prior to initiating the activity. An oversight by the shift engineer in the shift turnover led to the communication breakdown. The turnover weakness was discussed previously with plant management and corrective actions have been taken to prevent recurrence (Inspection Report 254/92003). Since procedural adherence for the event appeared adequate and errorless fuel handling performance has been observed for the past three outages, this item is considered closed.

No violations or deviations were identified.

3. Refuel Activities (60710)

During the inspection period the major refuel outage work involved degraded voltage modifications.

On April 6, 1992, licensee-performed preliminary engineering calculations for Unit 2, Division II critical voltage (power circuit) indicated that the Unit 2 second level undervoltage relay setpoint for the 4 KV safety buses was non-conservative. Due to cable lengths and bus loading arrangements, the potential existed that 480 volt safety related equipment might not be operable when required, due to insufficient terminal voltage during a degraded grid condition.

The undervoltage modifications were completed prior to Unit 2 startup and addressed all the undervoltage concerns. One modification implemented an automatic load shed of a total of eighteen nonessential loads on a high drywell pressure or a reactor low low water level whenever an emergency diesel start signal, with or without offsite power available, is received. The other modification initially involved cable pulls to various plant loads. These cable pulls were performed to lower the voltage drop between the affected load and its power source. Additions to the modification also added logic changes to the 1/2 diesel generator (DG) auxiliaries to address 1/2 DG operation single failure concerns for Unit 2 operation.

The licensee has implemented interim compensatory measures to ensure adequate voltage on the 480 volt safety buses for Unit 1 until modifications are installed. The 480 volt safety buses will be monitored by a computer/annunciator alarm and voltage recorded hourly by operations personnel. If the voltage decreases below 460 volts the load dispatcher will be notified to increase grid voltage. If voltage decreases below 450 volts, the bus will be declared inoperable and actions required by Technical Specifications will be taken. In the event of a verified Unit 1 LOCA signal and safety bus voltage going below 450 volts, that division will be disconnected from offsite power and automatic emergency diesel generator (EDG) sequencing will occur. Voltage calculations are expected to be complete for Unit 1 by July 31, 1992. Modifications similar to Unit 2 are scheduled for installation during the upcoming Unit 1 refuel outage.

4. 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.

On a sampling basis the inspectors daily verified the following: adequate 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); adequate monitoring of control room instrumentation for abnormalities; onsite and offsite power was available; plant and control room visits were made by station managers; and safety parameter display system (SPDS) operation. A review of inspector shift brief notes, the new fuel mispositioning event, and the Unit 2 hydro vessel temperature Technical Specification violation identified a decline in shift brief quality. The concerns related to poor attendance by key participants, occasional lack of adequate information exchange, and a lack of effective management involvement. The licensee is evaluating shift briefs to improve shift brief quality.

During tours of accessible areas of the plant, the inspectors made note of general plant and equipment conditions, including control of activities in progress (maintenance/surveillance), observation of shift turnovers, and general safety items.

One example of improved operator attention to detail, noted during the period was on April 21, 1992, when the Unit 2 nuclear station operator (NSO) noticed that the 2A and 2B recirculation MG set motor oil temperatures had increased approximately 20 degrees F. The NSO sent equipment operators out to investigate the dampers on the MG set and started the other vent fan. The equipment operators found the access door at the inlet plenum open. The inlet plenum was closed and temperatures returned to normal. This was considered as prompt and appropriate actions by all involved.

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 for proper actuation on an initiating signal, proper power supply to components required by TS or the 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, and cooling water supply.

ECCS Valves Outside FSAR Design Allowables

On April 27, 1992, a licensee Mark I event engineering review and analysis determined that valves in the residual heat removal (RHR) and core spray (CS) systems were outside of seismic Final Safety Analysis Report (FSAR) design due to "limber" yokes. The licensee considers the valves operable because calculations have shown the pressure boundary integrity of these valves will not be affected by yoke failures. Additionally, the valves are not required to change position during a postulated seismic event with a concurrent blowdown.

The valves are motor operated valves that originally had been designed as manually operated valves. The modification is believed to have occurred during construction of the plant. The valves are Crane manufactured gate and globe valves.

The licensee has committed to complete operability calculations by the end of May 1992. Crane and NuTech are working on parallel paths to find a suitable engineering solution. The licensee plans to modify the valve yokes during upcoming refueling outages.

b. Radiation Protection Controls

The inspectors verified that workers were adhering to health physics procedures for dosimetry, protective clothing, frisking, and posting, and randomly examined radiation protection instrumentation for use, operability, and calibration.

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 and protection of safety related equipment from intrusion of foreign matter.

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, quality assurance and/or quality control audit results, and postings required per 10 CFR 19.11.

No violations or deviations were identified.

5. 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 systems 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 or reviewed:

Unit 0

Q99586	Control Room HVAC Compressor Replacement

Unit 1

	1A Reactor Feed Pump Discharge Check Valve Repair
Q99753	RHR Minimum Flow Valve (1-1001-18A) Repair

Unit 2

Q98412	LPCI Injection Valves Contractor Installation Undervoltage Modifications H and I Installation

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.

6. 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 0

QOS 6600-1	Diesel Generator Monthly Load Test

Unit 1

QOS 6600-1	Diesel Generator Monthly Load Test
QOA 7750	Bus 18/19 Undervoltage Response
QCOS 1000-2	Monthly RHR Pump/RHR SW Pump Operability Test

Unit 2

QCTS 920-1 Shutdown Margin Demonstration
QTS 110-3 ECCS Simulated Automatic Actuation
QTS 7800 TP 7765 Contractor Pickup and Dropout Procedure
QTS 130-P Control Rod Timing and Rod Position Indication Test

No violations or deviations were identified.

7. Evaluation of Exercises for Power Reactors (82301)

On April 29, 1991, the resident inspectors, along with personnel from Region III, Headquarters, State of Iowa and associated municipalities, Illinois Department of Nuclear Safety, and the Federal Emergency Management Agency (FEMA), participated in a simulated exercise of the Generating Station Emergency Plan. Evaluation of State, local, and licensee performance was conducted by the NRC Division for the Analysis and Evaluation of Operating Data, Region III, and the FEMA. Preliminary results indicated weaknesses in the areas of event classification and timely notification of offsite agencies by the licensee. Further details will be discussed in NRC Inspection Report 254/265-92004.

No violations or deviations were identified.

8. Training Effectiveness (41400, 41701)

The effectiveness of training programs for licensed and nonlicensed personnel was evaluated by the inspectors by witnessing performance of surveillance, maintenance, and operational activities. Except for the 2A recirculating pump MG set deluge discussed below, personnel appeared to be knowledgeable of tasks being performed. In general, activities performed indicated an effective training program.

No violations or deviations were identified.

9. Report Review

During the inspection period, the inspector reviewed the licensee's Monthly Performance Report for March 1992. 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 Trend and Analysis Report for March 1992.

No violations or deviations were identified.

10. Events (93702)

a. Loss of Offsite Power Due to Reserve Auxiliary Transformer Deluge

On April 22, 1992, Unit 1 was operating at approximately 100% power and Unit 2 was shutdown with fuel in the vessel when the Unit 2 reserve auxiliary transformer (RAT) tripped. This resulted in complete loss of offsite power to Unit 2. The 1/2 diesel generator (DG) started and loaded to the appropriate bus. The Unit 2 DG autostart feature was defeated in order to perform load shedding modifications. The primary integrated leak rate test was in progress at the time. Reactor water temperature was at 131 degrees Fahrenheit (F) with shutdown cooling on when the RAT tripped.

Operator recovery actions were considered prudent and timely. A methodical approach to the restoration of the electrical distribution system utilizing the DG and 4 kv crosstie from Unit 1 was conducted. All components functioned as designed. Shutdown cooling power supply was immediately available via the DG, but was not required. Shutdown cooling was reestablished approximately two hours and twenty minutes after the RAT trip, with a resultant coolant temperature rise of 8 degrees F, to 139 degrees F.

The cause of the RAT trip was apparently due to an unplanned deluge system actuation. Nonlicensed operators were in the process of removing the deluge system from service when the actuation occurred. The inspectors interviewed appropriate personnel and reviewed documentation to ascertain root causes, which remain unknown. The licensee was unable to duplicate the actuation when the scenario was repeated. Deluge actuations in the past did not result in transformer failures.

Root cause determination by the licensee was indeterminate. The electrical portion of the deluge system was walked down and verified noncausal. The multimatic actuation valve was inspected with the vendor onsite and considered unlikely to have failed. The out of service activities were considered adequate to preclude system actuation. Although the root cause of the RAT trip is unknown, the licensee postulates that a combination of the deluge, atmospheric conditions, foreign substances in the lines, and the conductive properties of the fire system water supply combined to initiate the fault. The deluge spray pattern was verified functional per design. No permanent damage to the A transformer bushing (which arced to ground) occurred. RAT fluid samples indicated no internal damage. The transformer was returned to service on April 4, 1992. The inspectors have no further concerns pertaining to this event.

b. Unit 2 Recirculation MG Set Deluge

On April 13, 1992, an inadvertent actuation of the 2A recirculation motor-generator (MG) set deluge system occurred. The cause of the event was a personnel error by one of the equipment operators (EO) performing a return-to-service (RTS) on the deluge system. The EO received a tamper alarm upon completion of the RTS.

The EOs had experience with the isolation valves and felt they had been careful to check the valve positions, and were confident they were positioned properly. In an attempt to reset the tamper alarm the EO used the deluge "Fire Condition" switch which has "Reset, Normal, and Manual" positions. The EO recalled that some reset switches need to be taken both right then left to reset an alarm. Upon placing the switch in the manual position the deluge system actuated. One EO called the control room on the radio, while the other EO closed the manual isolation valve. The 2A and 2B recirculation MG sets were secured and inspected for possible water damage. No damage was found, and both were returned to service.

A contributing cause to the event was inadequate training; neither EO realized that the deluge system could be actuated from the local alarm panel. Additionally, the EOs should have called the control room for assistance prior to operating the fire condition switch. Disciplinary action and additional training was given to the EOs. The inspectors viewed corrective actions as adequate and have no further concerns.

c. High Pressure Coolant Injection (HPCI) Stop Valve Failure

On February 6, 1992, during post modification testing of the Unit 1 remote HPCI turbine trip button, unsuccessful attempts were made to close the HPCI stop valve. The HPCI turbine stop valve is a poppet type, hydraulically positioned shut off valve designed to close quickly on various trip signals to protect the HPCI turbine.

Subsequent troubleshooting activities identified that the outside of the poppet and the inside of the poppet guide, which was welded to the bonnet, were severely galled. This interference prevented the valve from stroking. The stop valve failure was reviewed during the Augmented Investigation Team's (AIT) inspection of the February 7, 1992, scram event.

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 AIT determined that the root cause of the valve failure was inadequate instructions for the maintenance work package (WP) that was completed in February 1991. The WP did not require as-found or as-left readings to be recorded for the clearances between the poppet guide and valve poppet. The welding caused the guide to become oval shaped and to lose perpendicularity with the bonnet. This condition caused the galling and the valve to become stuck open during a subsequent

HPCI valve stroke test. Failure to provide adequate work instructions is considered a violation of 10 CFR, Part 50, Appendix B, Criterion V (254/92011-01a(DRP)).

d. <u>Reactor Vessel Bottom Temperature Below Technical Specification Limits</u>

On March 29, 1992, while performing the Unit 2 reactor vessel class 1 hydrostatic test, it was observed that the temperature for the non-belt line vessel bottom head was below Technical Specification requirements. The cause of the low temperature was excessive control rod drive (CRD) water system flow. The higher flow introduced cooler water into the lower vessel area. At approximately 3:14 a.m. the shift engineer discovered the temperature discrepancy. Reactor pressure was immediately decreased to bring temperatures within acceptable limits and the test was terminated. A review of temperature data showed this condition had existed for about three and one half hours.

Technical Specification 3.6.B.1 states, in part, that hydrostatic testing shall be conducted only when vessel temperature is equal to or above that shown in the appropriate curve of figure 3.6-1. Additionally, 10 CFR 50, Appendix B, Criterion V, states, in part, that activities affecting quality shall be prescribed and accomplished in accordance with the instruction of a type appropriate to the circumstance, which shall include acceptance criteria for determining that the activities have been satisfactorily accomplished.

Through discussions with licensee personnel and a review of the test procedure the following personnel causal factors were identified: (1) During the shift brief, the shift engineer did not discuss the test limitations and actions, but talked about the test in general from what he remembered from writing the procedure. One of the limitations and actions not mentioned was on maintaining temperatures in accordance with TS curve 3.6-1; (2) The Assistant Superintendent of Operations (ASO) did not discuss test expectations with one of the two test directors. The ASO did not communicate to the test director what his responsibilities were or how the test should be conducted. (3) No one was given responsibility for assuring that test temperature parameters were recorded and evaluated to verify that vessel temperatures were maintained within test requirements. The test director was relying on the SE on shift who had written the test procedure and was periodically checking temperatures. Some of the temperatures were monitored but none were documented. The non-belt line temperature which was below TS requirements was on a recorder which the SE was monitoring occasionally. The SE was focusing on the belt line vessel temperatures and reported to the operations crew that everything was okay. About three hours into the test the SE became concerned about the test progress, and compared all temperatures to TS curve requirements and discovered the non-belt line temperature discrepancy. Documenting and evaluating all required vessel temperatures would have identified the TS temperature trend prior to violating technical specifications. The hydro was subsequently satisfactorily completed the next day using a lower CRD flow rate.

This failure to maintain vessel temperatures above TS limits and document acceptance of vessel temperatures during the hydro test is considered a violation of TS 3.6.b.1 and 10 CFR 50, Appendix B, Criterion V (265/92011-01b(DRP)).

e. Unit 1 Loss of Annunciators

On April 7, 1992, and April 9, 1992, due to contractor personnel errors, a loss of Unit 1 annunciators and recirculating pump trips occurred. The first occurrence was due to a contractor inadvertently stepping on a 125 vdc breaker while working in the 1A battery charger room. The circuit breaker supplies dc power to the annunciators and pump control circuit. The second occurrence was due to a contractor erecting scaffolding in the 1A battery charger room and inadvertently bumping a different 125 vdc breaker. In response to both events the operators took prompt and appropriate actions. As required by the licensee's emergency plan, an Alert for both events was declared for about a 10 minute duration until power was restored.

Corrective actions for the April 7, 1992, loss included counseling of contractors and implementing a pre-job approval and operations walkdown of contractor work area. The purpose of the walkdown by operations personnel was to identify to the contractors sensitive equipment in the work area. As a result of the second event, all contractor work was halted and a contractor work monitoring program was established. Phase 1 of the program required superintendent level approval of work activities and consultant attendance by CECo personnel at most contractor work areas. Phase 2 of the program required superintendent approval with periodic monitoring of contractor activity by a CECo individual. Contractor personnel involved in the April 7 and 9, 1992, events received disciplinary action. Presently, Phase 2 of the contractor control program is in effect. As of May 4, 1992, there have been no additional events involving contractor control. The inspectors will continue to monitor contractor work practices.

One violation with two examples was identifed.

11. Meetings and Other Activities (30702)

A meeting was held on April 28, 1992, between the Vice President for BWR Operations, the Station Manager, the licensee's Project Manager, the Region III Regional Administrator, the Branch Chief for DRP Branch 1, the Senior Resident Inspector, and members of their staffs. The purpose of the meeting was for the licensee to provide an update on the licensee's task force review of events from January 1, 1991, to April 10, 1992.

No violations or deviations were identified.

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 May 4, 1992. 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.