

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-254/82-18(DPRP); 50-265/82-20(DPRP)

Docket No. 50-254; 50-265

License 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 & 2

Inspection At: Quad-Cities Site, Cordova, IL

Inspection Conducted: September 8, 1982, through October 22, 1982

Inspectors: *R. D. Walker for*
N. J. Chrissotimos

11-19-82

R. D. Walker for
S. G. DuPont

11-19-82

Approved By: *R. D. Walker*
R. D. Walker, Chief
Reactor Projects Section 2C

11-19-82

Inspection Summary

Inspection on September 8, 1982, through October 22, 1982 (Report Nos. 50-254/82-18(DPRP); 50-265/82-20(DPRP))

Areas Inspected: Licensee Actions on Previous Inspection Findings; Inspection During Longterm Shutdown; Maintenance - Refueling; Surveillance - Refueling; Refueling Activities; Training; Technical Assistance to the Office of Nuclear Reactor Regulation; Followup on Significant Event; High Density Fuel Racks; Significant Event During Fuel Handling; Vessel Internal Inspections; Reactor Scram; Feedwater Sparger Modification; Licensee Event Reports Followup; Inspector Observation of Licensee's Corrective Actions; and Independent Inspection Effort. The inspection involved a total of 281 inspector-hours on site by two NRC inspectors including 32 inspector-hours onsite during off-shifts.

Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

*N. Kalivianakis, Superintendent
T. Tamlyn, Assistant Superintendent for Operations
D. Bax, Assistant Superintendent Maintenance
L. Gerner, Assistant Superintendent for Administration
*J. Heilman, Quality Assurance, Operations
*G. Tietz, Technical Staff Supervisor

The inspector also interviewed several other licensee employees, including shift engineers and foremen, reactor operators, technical staff personnel and quality control personnel.

*Denotes those present at the exit interview on October 22, 1982.

2. Licensee Action on Previous Inspection Findings

(Closed) Noncompliance (50-254/82-08-01): Failure to Perform Required Testing Prior to Declaring System Operability. The inspector verified that the actions described in the licensee's response letter of August 18, 1982 have been accomplished. The inspector has no further concerns.

(Closed) Noncompliance (50-254/82-08-02): Failure to Take Immediate Actions Required by Technical Specifications. The inspector has reviewed the actions described in the licensee's response letter of August 18, 1982 and has no further concerns.

(Closed) Noncompliance (50-254/82-08-03): Failure to Maintain Systems Installed to Prevent or Mitigate the Consequences of Flooding the Condensate Pump Room. The inspector verified that the actions described in the licensee's response letter dated August 18, 1982 have been accomplished. The inspector has no further concerns.

3. Inspection During Longterm Shutdown

The inspector observed control room operations to verify the licensee's adherence to the Technical Specifications and approved procedures during the months of September and October 1982. The inspector verified that the required surveillance tests were accomplished. The inspector also reviewed tagout records and ensured that the applicable containment integrity requirements were met. Tours of accessible areas were conducted to make independent assessments of plant and equipment conditions in accordance with regulatory requirements. The inspector observed the implementation of radiation controls and plant housekeeping, including control of potential fire hazards. The inspector also verified the implementation of the licensee's jumper/bypass system, physical security plan, and radioactive waste system controls.

No items of noncompliance or deviations were identified.

4. Maintenance - Refueling

The inspector verified maintenance procedures include administrative approvals for removing and returning systems to service, hold points for inspection/audit and signoff by Quality Assurance (QA) or other licensee personnel, provisions for operational testing following maintenance, provisions for special authorization and fire watch responsibilities for activities involving welding, open flame, and other ignition sources, provisions for review of material certifications, provisions for assuring Limiting Condition for Operation (LCO) requirements were met during repair, provisions for housekeeping during and following maintenance, and responsibilities for reporting defects to management.

The inspector observed the maintenance activities listed below and verified work was accomplished by qualified personnel in accordance with approved procedures.

Unit 1

WR 20874	1D RHR Service Water Pump Vent Line Repair (LER RO 82-21/03L)
WR 20960	1/2 A SBGT System Prefilter Replacement
WR 20967	CRD Scram Discharge Valve Maintenance
WR 21181	1/2 Diesel Generator Fuel Filter Replacement
WR 21240	1B RHR Heat Exchanger Bypass Valve Replacement
WR 21258	1/2A SBGT Heater Thermostat Replacement
WR 21615	HPCI Room Cooler Leak Repair
WR 21632	Back-up Scram Solenoid Maintenance
WR 21634	24vDC Battery Cell Testing
WR 21638	Core Spray Check Valve Maintenance

No items of noncompliance or deviations were identified.

5. Surveillance - Refueling

The inspector observed the station battery surveillance testing on Unit 1 to verify that the tests were covered by properly approved procedures, that the procedures used were consistent with regulatory requirements, licensee commitments, and administrative controls, that minimum crew requirements were met, test prerequisites were completed, special test equipment was calibrated and in service, and required data was recorded for final review and analysis, that the qualifications of personnel conducting the test were adequate, and that the test results were adequate.

No items of noncompliance or deviations were identified.

6. Refueling Activities

The inspector verified that prior to handling fuel in the core, all surveillance testing required by Technical Specifications and the licensee's approved procedures had been completed including required

periodic testing on refueling related equipment. During the months of September and October, 1982, the inspector toured the Unit 1 reactor building to verify that containment integrity and good housekeeping practices were maintained in refueling areas. The inspector also verified that the licensee's staffing during refueling operations was in accordance with Technical Specifications.

No items of noncompliance or deviations were identified.

7. Training

The inspector examined the licensee's overall training and retraining activities for non-licensed employees and general training for licensed employees to verify that the programs were in conformance with the Technical Specifications and Quality Assurance program requirements.

a. Program Changes

The licensee recently implemented a computerized training status system. The system presently is limited to recall of an individual's total training record from 1982 forward. Training records prior to 1982 are being tracked manually and will not be incorporated into the system. Following discussions with the inspector, the licensee will examine system capability for possible use as a scheduling tool for recurring training.

b. Records

The inspector reviewed the training records of ten non-licensed personnel from the mechanical, instrumentation, electrical, and administrative departments. All personnel folders reviewed contained records for employee background, on-site, and off-site training. Training courses appeared to be relevant to the job classifications of the personnel reviewed. The inspector also reviewed records of required repetitive training in the areas of annual radiation protection, security, and fire protection training to verify compliance with approved procedures.

The inspector reviewed records of several licensee and contractor female employees for training in prenatal radiation exposure. All licensee and contractor employees had signed acknowledgement sheets in their training record folders indicating annual training had been received by means of video tape, written information, and personal response to questions pertaining to prenatal radiation exposure.

c. Training Observation

The inspector attended the general nuclear training course which covers radiation protection, security, fire fighting, QA, respiratory protection, and basic nuclear science topics. The course lasted for approximately 3.5 hours. A 20 question multiple choice exam was administered on completion and required a 70 per cent

passing score. Changes in the program over the past year were highlighted, and NUREG 8.13 information was discussed separately with the female attendee.

The inspector discussed similar presentations of other facilities with respect to possible modifications of the program. The instructor discussed planned changes to the program with the inspector, which will include visual aids.

No items of noncompliance or deviations were identified.

8. Technical Assistance to NRR

On September 20, 1982, Messrs. Matthew Chiramal of the Office of Analysis and Evaluation of Operational Data (AEOD) and Roby Bevan of the Operating Reactors Branch, Office of Nuclear Reactor Regulation (NRR), visited the Quad-Cities site. Their purpose was to discuss and gather additional technical information concerning the circumstances surrounding the June 22, 1982 event. (IE Report 254-82-10/265-82-11, paragraph 14)

9. Followup on Significant Event

On June 22, 1982, the licensee experienced a loss of offsite power event as a result of attempting to remove reserve auxiliary transformer 22 (TR 22) from service for repair.

Following the event, the licensee committed to notify the NRC prior to removing TR 22 from service while the unit was operating. After many discussions, the Office of Nuclear Reactor Regulation determined that the licensee could perform the desired maintenance with the unit operating, provided that TR 12 (Unit 1 auxiliary transformer) and all three diesels were operable.

On the weekend of October 8, 1982, Unit 2 was shutdown for scheduled routine maintenance, (Unit 1 has been in refuel since September 6, 1982) and the licensee decided to perform maintenance on TR 22. Power was supplied to essential equipment by operating both Unit 2 and shared diesel generators in conjunction with feeding TR 12 to Unit 2. This electrical arrangement and maintenance on TR 22 was accomplished without any difficulties.

The licensee's conservative approach to performing this maintenance while the unit was down is indicative of good nuclear safety judgement.

No items of noncompliance or deviations were identified.

10. High Density Fuel Racks

During a tour, the inspector observed bubbles rising from the newly installed high density fuel storage racks located in the Unit 1 spent fuel pool.

The inspector questioned the licensee concerning the identification of the bubbles and the mechanism of generation. The licensee examined and identified the bubbles as mainly hydrogen, oxygen and some nitrogen.

Additional information was made available to the licensee in a report from Brand Industrial Service. It was determined that some generation of gas is a normally expected occurring byproduct of boraflex (boraflex is the material utilized for neutron absorption in high density fuel racks) in both an ionizing field as well as radiolytic decomposition of water. Brand Industrial Service had determined that the majority of gas generated by boraflex is nitrogen and oxygen while radiolytic decomposition of water forms hydrogen and oxygen. Further studies concluded that the gas generation rate would decrease approximately 50 per cent every few hours until after 100 hours when the rate would be less than 0.09 per cent.

Additionally, the licensee installed a boraflex sample adjacent to a fuel bundle to gather further information on boraflex. The test revealed no degradation.

The licensee has developed a surveillance program for testing neutron attenuation, material hardness and other physical properties of boraflex for the expected lifetime of the high density fuel storage racks. The licensee is also continuing analysis of the bubbles.

No items of noncompliance or deviations were identified.

11. Significant Event During Fuel Handling

While attempting to lift a fuel assembly out of the core during normal refueling operations on September 16, 1982, it was found that the assembly had become attached to its fuel support piece and the two components could not be separated. The support piece is normally positioned by guide pins on the lower core plate and supports four assemblies. The three other assemblies that rest on this piece had already been removed. Once out of the core, the licensee transferred both the assembly and the attached support piece to the Spent Fuel Pool via the refueling trolley grapple. Because of the attached support, the assembly could not be removed to the pool through normal methods.

The inspector witnessed the transfer of the fuel assembly from the vessel to the fuel pool. The transfer was accomplished in accordance with an approved temporary procedure and all possible precautions were taken to prevent an accidental dropping of the assembly. The inspector also observed that additional radiological precautions were taken while using the trolley grapple, which is not the normal method of transfer.

The General Electric Company is currently evaluating methods on how to separate the support piece from the fuel assembly. An analysis of the failure mechanism will be performed to determine possible generic concerns.

No items of noncompliance or deviations were identified.

12. Vessel Internal Inspections

The inspector witnessed the remote visual inspection of Unit 1 core spray spargers and jet pump beam bolts. The one mill wire calibration of the video camera was also witnessed. The inspections were conducted in accordance with approved procedures and requirements.

No items of noncompliance or deviations were identified.

13. Reactor Scrams

Unit 2

On October 17, 1982, the unit scrambled from 90 per cent power due to high Average Power Range Monitor (APRM) limits. The cause was determined to be the condensate demineralizer effluent regulating valves acting irregular in conjunction with a feedwater regulating valve drifting open. This caused a 100 per cent condensate demineralizer bypass valve to open and a standby condensate pump to automatically start. The excessive amount of cooler water now injecting into the reactor vessel caused the high APRM scram.

The licensee determined that the master controller for the effluent regulating valves was receiving incorrect signals from the local stations and proceeded to balance the system. The licensee has not been able to duplicate the problem experienced on the feedwater regulating valve and is still continuing to monitor its operation.

The inspector determined the status of the reactor and safety systems by discussions with licensee personnel and review of documentation.

No items of noncompliance or deviations were identified.

14. Feedwater Sparger Modification

The licensee is replacing the interference-fit design feedwater spargers with General Electric recommended triple-sleeve design spargers. The triple-sleeve design will substantially reduce bypass leakage flow. Previous designs caused high differential metal temperatures which resulted in fatigue and crack initiation of the nozzles. This temperature differential occurred whenever feedwater heaters were not in use as during startups and shutdowns. The triple-sleeve design reduces bypass flow by utilizing two piston-ring seals, an interference fit and three concentric thermal sleeves.

During preparation for sparger work, three items were lost inside the vessel: a section of rope, a wrench, and a lens cover from a submersible light. The inspector verified that the items were listed in the tools lost log and that the licensee will recover or conduct a loose parts analysis of the items prior to startup. The inspector has no further concerns in this area.

No items of noncompliance or deviations were identified.

15. Licensee Event Reports Followup

Through direct observations, discussions with licensee personnel, and review of records, the following event reports were reviewed to determine that reportability requirements were fulfilled, immediate corrective action was accomplished, and corrective action to prevent recurrence had been accomplished in accordance with technical specifications.

Unit 1

RO 82-12/01T, dated June 22, 1982, the 1/2 diesel generator tripped during a reactor scram. The circumstances concerning RO 82-12/01T are documented in Inspection Reports 50-254/82-10(DPRP) and 50-265/82-11(DPRP), Paragraph 14.

RO 82-13/03L, dated June 21, 1982, the diesel generator cooling water pump became airbound during surveillance. Concerning RO 82-13/03L, the pump became airbound after the suction line of 'A' RHR service water loop was drained and refilled for installation of a modification on June 20, 1982. The system was air loaded because the line was open for installation of new piping (LER RO 81-24, IE Reports 50-254/82-03(DPRP) and 50-265/82-03(DPRP), Paragraph 7). The general maintenance procedure did not have a precaution that specifically ensured the system would be completely vented. However, it is questionable that the precaution would have been effective because of the amount of air loading. The evolution was a unique, one-time modification to replace existing piping and the system was not designed to be airloaded in this manner. Thus, venting may not have prevented the airbounding of the pump. As corrective action, the licensee has added a precaution to the general maintenance procedure requiring venting. The actions taken by the licensee were adequate, and the inspector has no further concerns in this area.

RO 82-15/03L, dated June 28, 1982, the 1/2 A diesel fire pump was taken out of service for preventive maintenance. Concerning RO 82-15/03L, during overhaul of the fire pump, the 1/2 B diesel fire pump and a 3160 gpm portable diesel pump were available for fire protection as required.

RO 82-17/03L, dated July 13, 1982, while taking the inboard core spray injection valve (1-1402-25B) out of service for inspection, the valve failed to open. Concerning RO 82-17/03L, the failure was caused by water leaking through the valve packing gland. This damaged the rotor and brake of the valve operator motor which prevented the valve from opening. The valve was taken out of service in the open position and the 24B valve was positioned closed. If an automatic core spray injection was required, the logic would not be inhibited. Final corrective action is to replace the valve packing gland and repair the valve operator during the current refueling outage.

RO 82-23/03L, dated August 24, 1982, the 1A RHR service water pump removed from service for preventive maintenance on the RHR room cooler isolation valve.

RO 82-24/03L, dated August 26, 1982, the 1D RHR service water pump removed from service for preventive maintenance on the RHR room cooler isolation valve.

Concerning RO's 82-23/03L and 82-24/03L, the RHR service water pumps were taken out of service to perform minor preventive maintenance on the associated room cooler isolation valve packings. Both pump outages were limited to within one day. The inspector has no further concerns.

RO 82-26/03L, dated September 6, 1982, the flange seal gasket failed the load leak rate test (LLRT). Concerning RO 82-26/03L, the seal gasket will be replaced during the current refuel outage and a second LLRT will be performed following the repair.

RO 82-29/01T, dated September 16, 1982, cracks in the heat affected zone of the reactor water cleanup system piping discovered by ultrasonic testing. Concerning RO 82-29, the licensee will replace the reactor water cleanup piping with low carbon stainless pipe and fittings. The repair program committed to by the licensee requires the new pipe to be ASME SA-312, Grade TP 304 stainless with carbon content less than 0.035 per cent or TP 304L with the same physical properties of TP 304. The completed program will be reviewed by a Regional specialist and documented in inspection reports 50-254/82-19 and 50-265/82-22(DPRP).

RO 82-30/03L, dated September 5, 1982, 1D RHR service water pump packing failed during surveillance.

RO 82-31/03L, dated September 5, 1982, the RCIC system was taken out of service to perform a scheduled turbine overspeed surveillance.

RO 82-32/03L, dated September 5, 1982, the HPCI system was taken out of service to perform a scheduled turbine overspeed surveillance.

Unit 2

RO 82-11/01T, dated July 15, 1982, the LPCI inboard injection valve failed to open during surveillance.

RO 82-14/03L, dated August 2, 1982, RHR service water pump outboard gland and packing nut found off during operation. Concerning RO 82-14/03L, an equipment attendant, while performing his observation rounds, found the gland and packing nut off of the 2C RHR service water pump. The pump could have performed its intended function, but continued operation in this condition may have led to excessive gland and packing leakage.

The pump was repacked as preventive maintenance and returned to service on the same day. This occurrence is still under review by the licensee and a supplemental report will be submitted when the cause has been determined.

RO 82-15/03L, dated August 4, 1982, a small leak developed in the diesel generator flexible fuel line.

RO 82-16/03L, dated July 29, 1982, the 2B RHR service water pump was removed from service to adjust the pump seal packing.

No items of noncompliance or deviations were identified.

16. Inspector Observation of Licensee's Corrective Actions

As a result of recurring problems with RHR service water pump packing leaks, the licensee has initiated a program to resolve the problem.

A modification being considered involves sealing the bearings. This would eliminate the need to tighten packings during installation which has caused failures. Another action being considered involves installing mechanical seals to eliminate leakage through the packing. Both actions are currently being pursued to determine the optimum solution. The inspector considers licensee actions to be appropriate.

No items of noncompliance or deviations were identified.

17. Independent Inspection Effort

While reviewing NUREG/CR-2000 (Licensee Event Report Compilation, August, 1982), the inspector noticed that a Licensee Event Report (LER 82-39) from Duane Arnold may be applicable to Quad-Cities.

The report described a diesel generator failing to start due to a rusty air start solenoid. The corrective action was to add solenoid inspections to the diesel annual inspection.

The inspector discussed the applicability of this event with the licensee. Although the licensee had not experienced any failures of this nature, they previously had some minor moisture problems and modified the piping to eliminate them. Additionally, the licensee will add the solenoid to its inspection program.

No items of noncompliance or deviations were identified.

18. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) on October 22, 1981, and at the conclusion of the inspection and summarized the scope and findings of the inspection activities.