

U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-254/78-20; 50-265/78-21

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 Plant

Inspection at: Cordova, IL

Inspection conducted: August 22-25 and August 29 - September 1, 1978

Inspector: *L. J. Hueter*
L. J. Hueter

9-25-78

Approved by: *W. L. Fisher*
W. L. Fisher, Chief
Fuel Facility Projects and
Radiation Support Section

9-26-78

Inspection Summary

Inspection on August 22-25 and August 29 - September 1, 1978 (Report No. 50-254/78-20; 50-265/78-21)

Areas Inspected: (Routine, unannounced inspection of radioactive waste systems, including: effluent releases; records and reports of effluents; effluent control instrumentation; procedures for controlling releases; containment air-cleaning systems; reactor coolant water quality; solid radioactive waste; review of noncompliance corrective actions and licensee event reports; and review of an IE Circular and an IE Bulletin with licensee. The inspection involved 67.5 inspector-hours onsite by one NRC inspector.

Results: No items of noncompliance or deviations were identified in any of the nine areas inspected.

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DETAILS

1. Persons Contacted

- *J. Gudac, Assistant Plant Superintendent
- *L. Gerner, Technical Staff Supervisor
- *R. Flessner, Assistant Technical Staff Supervisor
- *J. Heilman, Quality Assurance Engineer
- *S. Hopewell, Rad-Chem Supervisor
- *T. Kovach, Lead Health Physicist
- P. Shafer, Health Physicist
- J. Sample, Health Physicist
- M. Whitmore, Chemistry Foreman
- W. Walschot, Chemist
- T. Markwalter, Chemist
- G. Sikkema, Chemist
- J. Miller, Jr., Engineering Assistant
- J. Forest, Staff Assistant-Radwaste
- D. Anderson, Staff Assistant
- M. Miller, Radwaste Foreman
- R. Bax, Unit 2, Operating Engineer
- G. Tietz, Thermal Engineer
- D. Clark, Engineer

*Denotes those present at the exit interview.

2. General

This unannounced inspection began at about 5:30 a.m. on August 22, 1978. Several tours were made of the plant during the inspection with special emphasis on the areas involving the radwaste systems. Housekeeping was satisfactory in the areas toured. The PPI system for solidification of radwaste remains inoperable.

Through the commendable efforts of the Radwaste Improvements and Exposure Control Task Force (established in July 1977) additional shielding has been installed, various equipment modifications made and handling techniques and procedures have been improved. These efforts have resulted in significant reduction in radwaste resins generated and, in turn, a reduction in the exposure of radwaste operators in processing, packaging and shipping the radwaste. Other Task Force initiated improvements are in progress.

3. Licensee Action on Previous Inspection Findings

(Closed) Infraction A (50-254/77-02): Waste sample tank release without prior analysis. System changes to allow use of a simplified

valving arrangement and a single tank (former waste surge tank but now called river discharge tank) for nearly all releases is now complete.^{1/} Procedure revisions and preoperational tests were completed and the system put into use in April 1978 with very favorable results.

(Closed) Infraction (50-254/77-25): Numerous radwaste shipments exceeding Type A quantities and three radwaste shipments exceeding Type B quantities were delivered to a carrier for transport without benefit of a general license, a specific license, or a specific exemption issued by the Commission. The inspector confirmed that since the last radwaste inspection concluded on September 2, 1977, no radwaste shipments have been made which exceeded Type B quantities and all radwaste shipments of packages exceeding Type A quantities were made with the benefit of the general license provision of 10 CFR 71.12.

(Closed) Infraction (50-254/78-07): Use of an unapproved continuous flow airline hood. The inspector confirmed that the licensee has taken the corrective action indicated in the licensee's response to the item dated April 24, 1978. Use of the unapproved hood has terminated. The licensee now has several approved hoods and stated that if they are used a flow of at least six CFM will be provided to each hood and that a calibrated airline pressure reducing regulator will be used.

4. Airborne Radioactive Effluents

Airborne release records were reviewed in detail for the first quarter of 1978 and cursorily for the third and fourth quarters of 1977 and the second quarter of 1978. No release limits or quarterly release rates which would have required licensee investigation, corrective action, and reporting appear to have been exceeded.

Release quantification continues to be based on daily grab samples from the chimney (noble gas) and any gas activity detected by the reactor building vent CAM and from daily integrated charcoal (iodine) and filter (particulate) samples from the chimney and reactor building vents.

No items of noncompliance or deviations were identified.

5. Liquid Effluents

Licensee records of liquid releases were reviewed in detail for the second quarter of 1978 and cursorily for the period September 1977 through March 1978. All releases appear to have been made in accordance with regulatory requirements.

No items of noncompliance or deviations were identified.

^{1/} IE Inspection Report No. 50-254/77-25.

6. Solid Waste

Solid waste shipment records were reviewed for the period September 1977 through June 1978. Waste, normally solidified with concrete in 55-gallon DOT Specification 17 H drums, is shipped in "sole use" trucks to licensed burial sites. Overpacks furnished by the vendor provide additional shielding, if needed, and provide approved containment, when needed, for individual packages containing greater than Type A quantities of radioactive material. For packages containing greater than Type A quantities of radioactive material, the licensee had records of the Certificate of Compliance for the package issued by the Commission to fulfill requirements of 10 CFR 71.12(b).

Solidified wastes are shipped as Group II based primarily on gamma spectral analysis. Gamma spectral analysis and transuranic analysis of samples of both Unit 1 and Unit 2 clean-up demineralizer spent resins collected on April 9, 1977 showed transuranics composed about 0.01% of the total activity.

Samples of Unit 2 powdex type condensate resins taken in December 1977 were analyzed for gamma emitters, strontium 90 and transuranics. Strontium 90 composed about 0.32% and transuranics about 0.01% of the total activity.

Analyses of both reactor water and reactor "crud" samples of Unit 2 reactor in February 1978 showed strontium 90 to compose about 0.11% of the total activity of both samples.

Another record, dated August 4, 1978, showed results of analyses of condenser spent resin sample (data collected and from which Unit were not identified) analyzed for the licensee by Science Applications Incorporated (SAI) for gamma emitters, strontium-90 and transuranics. Strontium 90 composed about 0.22% and transuranics about 0.0016% of the total activity. Additional samples of condensate demineralizer resins were sent to SAI for analyses in mid-August 1978 but results are not available yet.

The results of the above analyses suggest that radwaste concentrations of transuranics (Transport Group I) and of strontium 90 (Transport Group II) were such that Transport Group III nuclides were dominant in determining Type A quantity limits for the mixture. No problems were identified in reviewing the licensee's radwaste data with regard to use of proper limits for Type A quantities.

The licensee is using a new procedure for estimating the activity (curies) in a package. The procedure was developed for company wide use by Commonwealth Edison. The mathematical model includes using a buildup factor of 1.0 and includes weighing each package

for density considerations. Quantification of activity of selected packages by both the mathematical model and isotope analysis of samples of package contents have shown good agreement according to statements by licensee personnel. No items of noncompliance or deviations were identified.

7. Radwaste Solidification System History

Wastes which are solidification consist of spent powdered resin and filter sludge and bead type resins. The licensee has no waste evaporators and therefore no evaporator bottoms. The original concrete solidification system, with some modifications, continues to be operated. The licensee attributes past problems to such things as space limitations and design considerations which contributed to the frequent maintenance, handling, and resultant elevated personal exposure.

The wastes are transferred to spent resin holdup tanks, centrifuged for water removal, placed in a barrel with a given amount of water, cement added, stirred, capped, cleaned, checked for activity, and placed in shielded storage until shipment.

Improvements, many of which have been made in the past year due to the efforts of the Radwaste Improvements and Exposure Control Task Force (established in July 1977), include:

- a. An improved method of mixing resin to water in drums, as opposed to mixing water to dry resin, resulting in more resin volume per drum and less external contamination on drum surfaces.
- b. Use of plastic bags around drums prior to filling resulting in significantly reduced need for washing and decontamination after filling and capping.
- c. Increased capacity of barrel line shaker motors has essentially eliminated problems of barrel stoppage on conveyor and the operator exposure which resulted from manually moving drums down the conveyor.
- d. Use of an "air chipper" to keep drum mixer blades clean and thereby eliminate the concrete sediment drum used to collect residual cement and resin dripping from the blades. This drum had to be changed manually about ten times monthly resulting in about 75 mrem of dose for each barrel change.
- e. A mechanism has been devised to remotely bolt on the band that secures the drum lid. Also, additional shielding has been constructed at various locations in the radwaste solidification area.

- f. A new Spent Resin Hopper High Level Sensor has been installed outside of the hopper which eliminates overflowed resins, repairing defective internal hopper level alarm sensor, unplugging the hopper, and resultant exposure associated with such maintenance and cleanup.
- g. The telescopic cement tube, a frequent cause of maintenance and exposure has been replaced with a four-inch flexible hose for cement addition to spent resin drums.

To relieve a glut of demineralizer resins and sludges, additional processing was provided onsite by Chem-Nuclear Systems from March to June 1977. Solidification was done in shielded liners of up to 195 cubic foot capacity using urea formaldehyde.

A system was built onsite to solidify resin and sludge waste using urea formaldehyde and a catalyst. A series of preoperational tests of the system in early 1977 resulted in valve leaks, plugged piping and the catalyst reacting chemically with the stainless steel piping of the system such that the system never became operational. The licensee is considering modification of this system for use of the DOW process of waste solidification.

No items of noncompliance were identified.

8. Records and Reports of Effluents

Licensee records relating to airborne and liquid effluents appeared to be satisfactory. Comparison of these records with the licensee's semiannual effluent reports for the last half of 1977 and the first half of 1978 indicated no significant discrepancies.

9. Effluent Control Instrumentation

Effluent monitor functional test and calibration records for the period September 1977 through June 1978 were reviewed. All technical specification requirements appear to have been met with regard to functional tests and calibrations, including required alarm and trip levels. Up-to-date calibration curves were posted in the control room for the chimney monitors. Calibration curves for the chimney monitors are based on samples taken at the chimney. Because of the low release rates at this point (downstream of the charcoal off-gas adsorbers) the calibration curves are based on a limited range of data. The licensee has worked on calibration of the chimney monitors using sources of higher activity collected at the recombiner and letting these decay for various periods of time to represent varying "average gamma energy." A graph was then made of the microrcurie per second

per count per second (for a given stack flow) vs. the average gamma energy (MeV) of the gas mixture. The licensee plans to collect more data in the average gamma energy range of 0.2 to 0.3 MeV as this is the normal range of the average gamma energy at the stack. Calibration curves and alarm set points will then be based on results of these tests and previous tests. The licensee stated that this improved calibration will be completed by the end of 1978. The preliminary data suggest that past calibration of the chimney monitor in general may have been nonconservative. It should be noted, however, that determination of noble gas releases are not based on this monitor. Further, no control functions are tied to the monitor and alarm set points are based on administratively set levels.

The licensee has not used iodine monitors on either the plant chimney or the reactor vent but instead has analyzed daily charcoal filters. The licensee is working on a CAM type reactor vent monitoring system which is to use a sodium iodide detector and a spectrometer system such that a selected energy range window may be used to monitor iodine 131 on the charcoal cartridge. It was stated that no control functions to initiate major actions are planned for this monitor. This matter will be reviewed during a future inspection.

The high background reading of the liquid radwaste monitor is a continuing problem. Attempts at reducing levels by decontaminating the piping section in front of the sodium iodide detector were attempted during the inspection without success. The licensee agreed to review the matter of lowering the background levels at this monitor. This matter will be reviewed during a future inspection.

A new filter installed on the exit of the River Discharge Tank should minimize potential for particulate activity in the discharge line.

A composite sampler is being added to the liquid waste discharge line near the liquid radwaste monitor. This is in addition to the composite samplers already in existence after dilution of radwaste occurs.

No items of noncompliance were identified.

10. Radwaste Control Procedures

The following radwaste control procedures were reviewed:

- 200-12 Revision 1, 7-7-78 "Monthly Main Chimney Particulate Isotopic Summary"
- 200-13 Revision 1, 7-7-78 "Monthly Reactor Vent Particulate Isotopic Summary"

200-14	Revision 1, 7-7-78	"Monthly Main Chimney Off Gas Release Summary and Calculation of Average Percent of Limit"
300-5	Revision 2, 5-23-78	"Liquid Radioactive Waste Compositing"
2000-29	Revision 2, 1-28-78	"Discharge to River from River Discharge Tank"

No problems were noted in the review.

11. Containment Air Cleaning Systems

Licensee records of standby gas system in-place penetration tests for HEPA and charcoal filters and laboratory tests of charcoal filter samples were reviewed for the period September 1977 through June 1978. Tests results appeared satisfactory.

No items of noncompliance or deviations were noted.

12. Reactor Coolant Water Quality

Records of primary coolant surveillance for radioactivity were reviewed for the period August 1977 through July 1978. Requirements for iodine analyses (96 hours) and isotopic analyses (monthly) appeared to have been met.

No items of noncompliance or deviations were noted.

13. Review of Action Regarding IE Circular No. 77-14

In response to IE Circular No. 77-14 issued November 28, 1977, the licensee conducted the requested review to identify interconnections between contaminated and noncontaminated water systems and to assure that proper separation had been provided. Memo NJK-77-619 dated December 22, 1977 identifies the interconnections and type of separations and states a review of Station Procedures indicated that procedures governing operation of the Domestic Water System should be upgraded. This updating was completed by Revision 4 dated January 20, 1978 of Operating Procedure 4200-1 titled "Well Water System." It involves procedures to be followed should the heating steam become contaminated. The licensee now performs weekly direct radiation surveys in the heating steam building and a monthly sampling and analysis of water from the heating steam system which is considered the most likely source of contamination. The licensee had experienced contamination in the heating steam system prior to issuance of this circular and has made valving and piping modifications to minimize potential for future occurrences as noted in Paragraph 16.

The inspector has no further questions on this matter.

14. Review of Response to IE Bulletin No. 78-07

The inspector reviewed the licensee's response dated August 3, 1978 to IE Bulletin No. 78-07 concerning protection afforded by air-line respirators and supplied-air hoods. The inspector confirmed that the licensee is not currently using air-line equipment operated in the demand mode and that use of air-line equipment operated in the demand mode is not planned by the licensee.

As stated in the response, the licensee is not currently using supplied air hoods. The licensee has recently acquired six NOISH certified supplied-air hoods for evaluation. The licensee stated that these will be used only with a flow of at least six CFM to the hood and that calibrated airline pressure reducing regulators will be used.

The inspector has no further questions on this matter.

15. Followup on LER RO 50-265/77-16^{2/}

The inspector reviewed the licensee's efforts to repair a leak in the "A" Residual Heat Removal (RHR) System of Reactor Unit 2. The leak was detected May 28, 1977. The licensee stated plans to make the repair no later than the refueling outage scheduled to begin in January 1978. Original repair attempts were conducted about mid-January 1978 but without success as a metal bellows crack had apparently been undetected. A second attempt was made during the outage but when the system was put back in operation on March 6, 1978 a small leak of about a half pint an hour was still detected which is believed to have been a metal gasket leak. A third repair conducted between April 17 and 28, 1978 proved to be successful as evidenced by the elimination of spikes on the Unit 2 Service Water Process Radiation Monitor when the "A" RHR service water pump was initiated. The inspector has no further question on this matter.

16. Followup on Contamination in Plant Heating Steam System

A special inspection^{3/} was conducted in October 1977 concerning contamination found in the heating steam system. At the conclusion of the inspection the licensee stated that piping and valving modifications were being implemented to minimize the potential for contaminating the steam heating system. These modifications have been completed. Further, the licensee committed to weekly direct radiation surveys of specific locations in the heating system and that monthly analyses of liquid samples would include condensate from the heating steam system deaerator. The inspector

^{2/} IE Inspection Report No. 50-254/77-24.

^{3/} IE Inspection Report No. 50-254/77-28.

verified that the direct radiation surveys and liquid sample analysis are being conducted. Gross beta analysis of the liquid samples has returned to the normal background levels.

The inspector has no further questions regarding this matter which is related to IE Circular No. 77-14. (Paragraph 13)

17. Review of LER/RO 78-04/03X-1

On January 18, 1978, while performing the automatic steam jet air ejector offgas isolation surveillance for Unit 2, while in an outage, the offgas holdup pipe drain valve failed to isolate. The inspector reviewed from a radiation protection consideration the licensee's evaluation of the probable consequences, cause and corrective action associated with the occurrence and has no further questions concerning the matter.

18. Review of LER/RO 78-06/03L

The plant chimney monitoring system was inoperable for parts of three days in February 1978, twice due to power interruption caused by excavating in the area and once due to a leak developing in a sample line hose. One reactor unit was in refueling mode throughout the period and the other was in the shutdown mode until the day of the last occurrence. No abnormal transients occurred during the period and other means were utilized to quantify plant chimney releases. The inspector reviewed from a radiation protection consideration the licensee's evaluation of the probable consequences, cause and corrective action associated with the occurrence and has no further questions concerning the matter.

19. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on September 1, 1978. The inspector discussed the scope and findings of the inspection. The following matters were specifically discussed:

- a. The inspector noted during a tour that a couple of radwaste barrels labeled LSA were found in use for clean trash barrels outside of the main building area. Licensee personnel stated this matter would be reviewed.
- b. The inspector noted a number of improvements have been made in the radwaste systems resulting in simplifications, reductions in resin usage, reduction in resin waste packaged and reduction

of exposure of personnel working in the radwaste areas. Much of this effort appears to be attributable to the Radwaste Improvements and Exposure Control Task Force which was established in July 1977.

- c. The matter of the chimney monitor calibration curves being based on a limited range of data and the progress of performing a better calibration utilizing a wider range of data was discussed. The licensee stated that further testing with higher activity samples in the proper weighted gamma energy range would be conducted and calibration curves and alarm set points will be based on results of these tests and the previous tests. The licensee stated that this improved calibration will be completed by the end of the year (1978). (Paragraph 9)
- d. The matter of continuing high background reading at the liquid radwaste monitor was raised by the inspector. The licensee agreed to review the matter for ways to lower the background reading. (Paragraph 9)