

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-254/92015(DRSS); 50-265/92015(DRSS)

Docket Nos. 50-254; 50-265

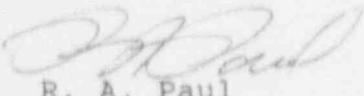
License Nos. DPR-29; DPR-30

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

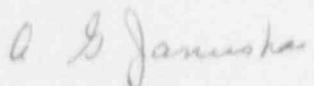
Facility Name: Quad Cities Nuclear Generating Station, Units 1  
and 2

Inspection At: Quad Cities Site, Cordova, Illinois

Inspection Conducted: April 28, May 13 - 15, and 18 - 22, 1992

Inspectors:  R. A. Paul

6/12/92  
Date

  
A. G. Januska

6/12/92  
Date

Approved By:   
M. C. Schumacher, Chief  
Radiological Controls and  
Chemistry Section

6/12/92  
Date

Inspection Summary

Inspection on April 28, May 13 - 15, 18 - 22, 1992 (Report Nos. 50-254/92015(DRSS); 50-265/92015(DRSS))

Areas Inspected: Routine unannounced inspection of the radwaste program including (1) liquid and gaseous radwaste (IP 84750), (2) solid radwaste and transportation (IP 86750), (3) contamination control (IP 83750), (4) training and qualification of contractor technicians (IP 83750 and 84750), (5) as low as reasonably achievable (ALARA)(IP 83750) and (6) the review of open items and a violation from previous inspections (IP 83750 and 84750).

Results: The licensee's radwaste and transportation programs were well conducted. Operational problems with the service water monitors were noted and are being addressed (Section 8); 1992 station dose will increase considerably owing largely to multiple outages (Section 6); and personnel contamination events have decreased (Section 5).

## DETAILS

### 1. Persons Contacted

- <sup>1</sup>R. Bax, Station Manager
- <sup>1</sup>P. Behrens, Chemistry Supervisor
- <sup>1</sup>S. Flaker, Nuclear Quality Programs
- <sup>1</sup>J. Jessen, Radiation Protection
- <sup>1</sup>D. Kanakares, Regulatory Assurance NRC Coordinator
- <sup>1</sup>A. Misak, Regulatory Assurance Supervisor
- <sup>1</sup>T. O'Leary, Nuclear Quality Programs
- <sup>1</sup>R. Wiebenga, Chemistry
- <sup>1</sup>M. Zinnen, Radiation Protection
  
- <sup>1</sup>J. Shine, Resident Inspector, NRC

<sup>1</sup>Present at the Exit Meeting on May 22, 1992

### 2. Licensee Action on Previous Inspection Findings (IP 83750 and 84750)

(Closed) Open Item (50-254/89005-02; 50-265/89005-02):  
Licensee to resolve discrepancy between Brookhaven National Laboratory and lab results for iron, copper, fluoride and chloride. During inspection 50-254/92013; 50-265/92013 the inspectors provided chemistry samples for analyses. These results and the results from a crosscheck program with a vendor did not indicate problems analyzing these analytes. This item is considered closed.

(Closed) Violation (50-254/92005-01; 50-265/92005-01):  
Failure to keep High Radiation Area (HRA) doors locked. The licensee received a standard Technical Specification (T/S) waiver to lock HRA doors at 1000 millirem per hour instead of the 10 CFR 20 required 100 millirem per hour. In addition the licensee placed the HRA program under the control of Radiation Protection (RP). Issuance of keys and verification that the doors are locked prior to the key being returned are the responsibility of RP. Since these measures have been implemented no HRA T/S violations have occurred.

### 3. Training and Qualifications (IP 83750 and 84750)

The inspectors reviewed the licensee's selection criteria, the education and experience qualifications, and training of contract radiation protection technicians (CRPTs).

Licensee selection and verification of CRPTs are covered by procedure QAP 1000-6 "Radiation Protection Contractor Program". In addition, written guidance providing criteria

for calculating hours credited for American National Standards Institute (ANSI)-3.1-1978 qualification is used; this guidance is issued from corporate health physics. Selection includes review of technicians' resumes to determine conformance with ANSI-18.1-1971 criteria for responsible technicians, which is part of the contract requirement, and past performance at other Commonwealth Edison facilities. Telephone interviews with other Edison stations are performed for selected candidates to verify qualifications described on the individual's resume. Additionally, station personnel verify experience and qualifications of CRPTs through discussions with the on-site contract vendor representative. No formal verifications are performed, nor does the licensee perform a formal audit of the vendor. The station hired 20 ANSI 18.1-1971 qualified technicians for the outage. Most were seniors and only a few were assigned to difficult or higher dose producing jobs. The inspectors reviewed selected resumes of CRPTs hired for the current outage and discussed several of them with licensee representatives. All met the licensee's T/S two year experience requirement (ANSI-18.1-1971); most exceeded the requirement.

After selected technicians arrive on-site they are required to pass a written health physics proficiency exam on nuclear physics theory and practical health physics problem solving. The tests are selected from a bank of questions generated by the corporate office; questions are sometimes added or deleted by the station to tailor their own needs. The licensee indicated they place considerable weight on these tests for the selection process. One of the tests was reviewed by the inspectors and found to be reasonably difficult with a good mix of theoretical and practical questions. Following successful completion of the exam each technician is required to complete licensee procedure training, health physics equipment and application training, and site specific training. Examinations are given for these areas and successful completion is required. No mockup training was provided because the CRPTs do not generally cover jobs where mockup training is important.

No violations or deviations were identified.

4. Audits and Appraisals (IP 84750 and 86750)

The inspectors examined audits and Field Monitoring Reports (FMRs) related to radwaste and transportation. Nuclear Quality Programs (NQP) auditors performed many waste shipment FMRs during 1991 which covered varied facets of burial shipments, supercompaction shipments and also dirty RWP clothing shipments. No substantive findings were identified. The inspectors also reviewed three Quality

Program audits conducted by NQP auditors in 1991 and 1992 involving, in part, the gaseous, liquid and solid radwaste processing and effluents programs. One of the audits had findings concerning the testing of the carbon filters on the control room emergency filtration system; this finding was closed as a result of corrective action.

No violations or deviations were identified.

5. Control of Radioactive Materials and Contamination, Surveys, and Monitoring (IP 83750)

Personnel contamination events (PCEs) defined as 1000 dpm measured at 2 cm with a 15 cm<sup>2</sup> probe on skin or personal clothing have been on the decline since 1987 when 528 were recorded. In 1991 there were 105 PCEs with 132 outage days.

For 1991 the percent of plant area contaminated was approximately 11.9% going into the unit 2 refueling outage. At the end of this inspection it was about 26% reflecting the just completed outage. The licensee's contamination goal is to be at less than 15% six weeks after the outage.

The inspectors discussed restrictions or delays placed on personnel due to contaminated areas. An operations supervisor indicated that this is generally not a problem during outages when the reactor building basement is controlled uniformly as a contaminated area. At other times the combinations of clean and contaminated areas require more clothing changes. He further stated that recent initiatives taken with Radiation Protection (RP), such as use of closed circuit TV are helping to ease this situation.

No violations or deviations were identified.

6. As Low As Reasonably Achievable (IP 83750)

The inspectors reviewed the ALARA program's performance and initiatives implemented during outage Q2R11. There has been a slight increase in station dose over the last five years, although somewhat below the BWR national average. The station projected dose for 1992 (1150 person-rem) will be above the 1991 dose of about 510 person-rem due to a 62 day outage extension (because of cracks discovered in the shroud access cover requiring repair and modifications on electrical systems) and another scheduled outage. The total outage dose was 489 person-rem of which about 39 person-rem was attributed to the extended outage, and emergent and first time work.

ALARA efforts continued to be taken for the outage such as source term reduction (flushing of headers and drain lines),

chemical decontamination (reactor recirculation and RWCU systems), mockup training (recirculation pump seal work, control rod drive overhaul, valve repair work), shielding (drain headers from the reactor cavity and dryer separator pit in the reactor building and piping in the drywell), use of dose saving equipment (cameras/monitors, portable decon booths, communication systems), and administrative measures (freezing work scope to all but emergent work). A significant additional effort was the recent development of a central valve group which includes all disciplines (mechanical, electrical, and instrument maintenance), contractors and technical staff) involved in valve inspection and repair, and coordinates all efforts in the valve test program. Some of the major efforts of the group are to initiate improved preventive maintenance to reduce repair/replacement, reduce piecemeal work and frequency of valve repacking, minimize number of tests, develop more dose reduction initiatives, and improve lessons learned files, all of which should reduce dose. The effect of the group's efforts to reduce personal exposure will continue to be reviewed.

Contributing to additional dose were several first time jobs (some of which were emergent work) without job histories and lessons learned such as beam repairs in the 2A and 2B Residual Heat Removal (RHR) room and the High Pressure Cooling Injection (HPCI) sparger modification. The inspectors examined two similar jobs (2A and 2B RHR beam reinforcement) performed during outage Q2R11 where dose estimates of 7.5 rem were exceeded by 11.2 rem and 0.3 rem. The review was made to evaluate the effectiveness of ALARA measures.

During this review the inspectors noted that: (1) neither of these jobs was originally scheduled for Q2R11 beginning January 1, 1992, and when the licensee scheduled them late in 1991 there was insufficient time for good preplanning which could have reduced exposure; (2) a request for shielding made during the 2ARHR operation was unfulfilled because the assigned Technical Staff person was taken off the job to satisfy a higher priority; and (3) having to work around the obstacle presented by a pipe in 2BRHR (which was later removed to accomplish another scheduled modification) impeded work and together with improper welding caused additional, unnecessary work. Better preplanning, engineering, scheduling, and coordination of the multiple jobs in this area may have saved an estimated 2 to 3 person-rem in 2BRHR.

In summary, it appears the 1992 increased station dose is largely the result of extending the outage by 62 days and considerable emergent and first time work. It appears the

ALARA initiatives made during the outage were generally effective, and based on some of the work packages reviewed it appeared adequate ALARA reviews were performed. However, based on the RHR jobs examined it appears ALARA program improvements are needed in preplanning, scheduling, and coordination. The need for developing improved lessons learned and historical files in departments other than ALARA was also noted.

No violations or deviations were identified.

7. Gaseous Radioactive Waste (IP 84750)

The inspectors reviewed the licensee's gaseous radwaste management program, including changes in equipment and procedures, gaseous process and effluent monitors, and records of effluent releases.

Gaseous effluents are exhausted from the plant via two pathways; the main chimney and the reactor building ventilation stack. The main chimney is an elevated (310 foot) release point with inputs from the condenser offgas air ejector, standby gas treatment system, and the turbine building. Main chimney releases are continuously monitored for noble gases by two sodium iodide detectors and a system-level, particulate, iodine, noble gas (SPING) air monitor. Under accident conditions, the effluents are passed through a high range post accident sampling system. Because no radioactivity has been detected from the weekly noble gas samples at the main chimney exhaust system for several years, the licensee uses the results of the noble gas samples taken from the air ejector and recombiner systems to compute chimney releases; iodine and particulate samples taken from the chimney SPING are used to quantify radioactive effluents.

Reactor building ventilation (RBV) for both units is released via a common stack at the roof top of the reactor building. This pathway also includes occasional inputs from the drywell (venting/purging) and torus. This pathway is monitored for noble gas before entry into the common stack. Releases are quantified by continuous particulate and charcoal samples taken in the exhaust plenum of each unit and by weekly noble gas grab samples.

Review of the semiannual effluent reports for 1991 indicated no instances of a release exceeding T/S limits. Total noble gas released in 1991 was low at about 42 curies. During this period there was one abnormal gaseous release which involved the bypassing of the unit 1 charcoal adsorbers because of high off-gas flow causing a high differential pressure on the adsorbers. The cause of the high flow was

identified and a total of one curie of activity was released and accounted for in the semiannual report.

No violations or deviations were identified.

8. Liquid Radioactive Waste (IP 84750)

The inspectors reviewed the licensee's liquid radioactive effluent program including information concerning: waste sampling, process and effluent release paths, batch releases and procedures for waste and effluent streams. The program was reviewed for calendar year 1991 and 1992 to date.

Liquid effluents are released on a batch basis from a single tank (following sample and analysis) to a single release path which is a monitored (with alarm) radwaste line. The effluents from the line are diluted with station circulating water to assure that the effluent reaching the river is below MPC for the mixture of all nuclides released. Most plant liquids, including chemical waste liquids, are processed and reclaimed by use of filters and resin beds. Batch releases consist mainly of laundry water which is filtered before release. There were only eight liquid discharges made in 1991, and about seven in 1992 to date.

Analyses of batch liquid releases include two grab samples of the circulating water with verification that gross beta counts of both samples are within 20 percent of each other. Both samples are counted using a germanium system to identify and quantify the concentration of gamma emitting nuclides. For beta emitters, including strontium-89 and 90, iron-55 and tritium, concentrations are determined by analysis of composite samples.

The concentrations of each gamma emitting nuclide and the available dilution water flow rate are used in calculating the sum of MPC fractions for the gamma emitters, the allowable radwaste discharge flow rate, and the setpoint of the monitor on the discharge line. Beta emitters are accounted for in the discharge. A safety factor of 10 is built into the equation by taking credit for only 10 percent of the actual dilution water. An additional safety factor of about two is used as a result of considering only half of total flow in the dilution equation. Selective review of release records identified no problem with determination of release rates, and setpoint determination and settings and it appeared radioactive effluent releases were conducted in accordance with the procedures.

During 1991 both units service water monitors (SWM) were out of service (OOS) for repair, maintenance and line flushing. In addition to normal routine maintenance the unit 1 SWM was

out of service for two long periods, one of which extended until May, 1992. The first OOS period was due to an error associated with preventative maintenance and the second was due to spiking. The cause of the spiking was not readily identifiable by either the licensee or by the manufacturer during the investigation. The system was almost completely rebuilt before the problem was identified and the system repaired. Compensatory sampling was performed in accordance with T/S requirements. Accumulation of mud in the system, which continues to be a problem, has been addressed and is treated with routine quarterly flushing and more often if needed. The licensee has formed a task force comprised of representatives from chemistry, engineering and operations to review the operability; specifically buildup of silt caused in part by the length and configuration of the sampling lines. RHR service water leakage has been identified and is being monitored by the licensee. As a result, a spike of radioactivity is noted when the RHR pump (normally off) is turned on for monthly surveillances or for shut down cooling. Radioactivity for this release path is accounted for in the Semi Annual Operating Report. The RHR repair is scheduled for the next extended unit outage.

No violations or deviations were identified.

9. Dose Assessment (IP 84750)

The inspectors reviewed the licensee's methodology for measuring offsite doses from liquid and gaseous releases. Confirmatory calculations using the ODCM for typical gas and liquid releases were in agreement with the licensee's.

No violations or deviations were identified.

10. Air Cleaning Systems (IP 84750)

A selective review of the surveillance test data for the T/S ventilation system high efficiency particulate filters and charcoal adsorbers performed in October and November, 1991 appeared to meet test acceptance criteria. Records show the DOP penetration and the halogenated hydrocarbon penetration to be less than the one percent criteria for HEPA filters and charcoal adsorbers respectively. In addition, a laboratory analysis of a representative carbon sample from each train for methyl iodide removal has been performed by a contractor with records showing the removal efficiency to be greater than the 90 percent criterion specified in the technical specifications.

No violations or deviations were identified.

11. Effluent Control Instrumentation (IP 84750)

The inspectors selectively reviewed calibration and channel functional test records and selected setpoint records for effluent radiation monitors on the liquid and gaseous radwaste systems. The inspectors also walked down each of the liquid radwaste monitors and most of the gaseous particulate and iodine monitors. Technical Specifications require calibration of the monitors at 18 month intervals and quarterly functional tests. The calibrations and functional tests were performed as required. The inspectors also noted that licensee procedures require an "as found" test on the T/S noble gas monitors to determine if the monitor response had changed since the previous calibration. None were required for the T/S liquid monitors but chemistry representatives indicated that such tests would be implemented.

No violations or deviations were identified.

12. Solid Radwaste and Transportation (IP 86750)

The inspectors examined the licensee's solid radwaste program including the semiannual effluent report and documentation of shipments. Waste reduction efforts were also discussed. The final operations of the preparation of a high integrity container (HIC) shipment were observed by the inspectors including the final radiation survey and the quality control check.

The inspectors reviewed documents for shipments of spent resins. The documents contained the required information regarding classification, form, activity per shipment and per nuclide, pre and post vehicle surveys, instructions for shipment maintenance, hazards, emergency actions etc. The licensee also demonstrated his method for classifying shipments. It is done in accordance with 10 CFR 61.55 and is based on analyses of waste stream samples.

The licensee continues to implement several measures to reduce dry active waste (DAW) volume. The chief measures include limitations of potential DAW entering the controlled area and compaction at the station and further compaction by vendors. The licensee plans to begin segregation of DAW in the controlled area before the fall refueling outage. This is intended to identify waste that has little probability of being contaminated for subsequent survey and sorting before disposal.

The licensee shipped approximately 26700 ft<sup>3</sup> of solid waste in 1991, a decrease of 37.5% from 1990 and expects to ship

a relatively constant volume per year for the next 5 years. There were no transportation related incidents.

No violations or deviations were identified.

13. Waste Storage (IP 84750)

The inspectors examined the licensee's Interim Radwaste Storage Facility (IRSF). The facility, which consists of a storage area, a truck bay, a control room and a heating and ventilation room, has not been turned over to the station. The storage area was being used for temporary storage of noncontaminated craft equipment and the truck bay was being used for temporary storage of a large contaminated motor. A 10 CFR 50.59 review is being performed to extend the allowed use to include packaged DAW and solid waste in polyethylene HICs.

The facility has a supply and a nonfiltered exhaust for the storage area, a diesel fume exhaust in the truck bay and a floor drain sump for each of these areas. The sumps do not communicate with any liquid discharge system. They annunciate in the reactor control room when full and the liquid must then be analyzed prior to being pumped out.

Particulate air monitors and area monitors are scheduled for installation in the facility when completed.

No violations or deviations were identified.

14. Surveillance-Plant Tours (IP 83750)

During tours made of the IRSF and the outside areas within the protected area, the inspectors noted a number of tractor trailers, and sea vans that were placarded indicating the presence of radioactive materials. The licensee stated that these do not contain stored waste but low level contaminated outage related materials such as scaffolding and timbers. Other such storage vehicles and a mixed waste storage facility were also noted in the owner controlled area adjacent to the protected area. The inspectors examined licensee surveys which indicated that these did not require them to be treated as restricted areas in accordance with radiation levels listed in 10 CFR 20.105. The license stated that the importance of these surveys will be restated to the R technicians to assure that conditions do not change which would require reclassification of these areas.

No violations or deviations were identified.

15. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on May 22, 1992. The inspectors discussed their observations concerning increased station dose, findings from a review of two specific outage jobs, the ALARA program in general, and the radwaste program. During the exit interview, the inspectors discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. Licensee representatives did not identify any such documents or processes as proprietary.