U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/86012(DRSS); 50-265/86011(DRSS)

Docket Nos. 50-254; 50-265 Licenses No. DPR-29; DPR-30

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690

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

Inspection At: Quad Cities Site, Cordova, Illinois

Inspection Conducted: May 28 - 30 and June 4 - 5 and 17, 1986

Inspector: M. Schumacher for L. J. Hueter 6/27/86
Date

Approved By: M. Schumacher Martin C. Schumacher, Chief 6/27/86
Radiological Effluents and Date
Chemistry Section

Inspection Summary

Inspection on May 28 - 30 and June 4 - 5 and 17, 1986 (Reports No. 50-254/86012(DRSS); 50-265/86011(DRSS))
Areas Inspected: Routine, unannounced inspection of gaseous and liquid radioactive effluents including: effluent releases; records and reports of effluents; effluent control instrumentation; procedures for controlling releases; reactor coolant chemistry and activity; gaseous effluent filtration; and audits.
Results: No violations or deviations were identified.

DETAILS

1. Persons Contacted

[2]R. Bax, Manager
P. Behrens, Lead Chemist
[2]C. Dages, Engineering Department
J. Forrest, Operating Staff
[1] [2]M. Kooi, Compliance
[2]J. Kopacz, Technical Staff Supervisor
R. Lezon, Chemist
[1] C. Norton, QA Engineer
[2]D. Rajcevich, Master Instrument Mechanic
[1] [2]R. Robey, Services Superintendent
[1] [2]J. Sirovy, Rad/Chem Supervisor
[2]G. Spedl, Assistant Superintendent, Technical Services
[1] T. Tamlyn, Production Superintendent
[2]M. Turback, Operating Plant Licensing Director
R. Wiebenga, Chemist

[1] A. Madison, NRC Senior Resident Inspector
A. Morrongiello, NRC Resident Inspector

[1]Denotes those present at the June 5 site meeting.
[2]Denotes those present during the June 17, 1986, telephone conversation.

The inspector also met with other licensee staff.

2. Licensee Action on Previous Inspection Findings

(Closed) Open Item (254/85006-07; 265/85006-07): Licensee to modify radwaste shipping procedures to incorporate current practices and 10 CFR 61 and 10 CFR 20.311 requirements. A computer program designed to prompt the user on all aspects of radwaste shipments being developed by a licensee contractor has not been accepted by the licensee as originally planned. Therefore, the licensee has modified the existing radwaste shipping procedures to incorporate current practices and 10 CFR 61 and 10 CFR 20.311 requirements.

(Closed) Violation (254/85021-01; 265/85024-01): Failure to collect required 10 hour grab samples on June 13, 1985, when the service water monitors were inoperable. The licensee took procedural measures to assure the collection and analyses of grab samples as required and the inspector confirmed by review of records that no subsequent samples were missed. However, the underlying problem of faulty service water monitors has not been fully corrected. New monitors were declared operable on February 14, 1986, but subsequent electronic spiking problems required them to be declared inoperable again in February (Unit 2) and March 1986 (Unit 1). The Unit 2 monitor was again declared operable in May 1986; the Unit 1 monitor was again declared operable in June 1986. The licensee has continued to take the 12 hour grab samples throughout, even during periods

when the monitors were regarded as operational. Licensee followup actions on this problem will be tracked under a separate open item (Section 6).

3. Gaseous Radioactive Waste

The inspector selectively reviewed the licensee's gaseous radwaste management program, including effluent records and semiannual effluent reports, for calendar year 1985 and the first five months of 1986.

Since July 1, 1985, Unit 1 has been in operational status except for two short (lasting 2 to 6 days) outages and a refueling outage lasting from January 6 to April 7, 1986. During this same period, Unit 2 has been in operational status except for four short outages lasting 1 to 10 days.

The licensee's gaseous radwaste system, instrumentation, controls and release paths are basically unchanged from that described in Inspection Reports No. 254/85021 and No. 265/85024. One area of potential concern identified during the current inspection involved quantification of noble gas releases from the reactor building vent duct. Monitors using G-M tubes monitor noble gas in the reactor building vent ducts before they join into a common duct. After the two ducts become common, a CAM monitored the noble gas until the spring of 1984 when the CAM was removed after installation of a SPING-4 monitor. Noble gas releases from the reactor building vent duct are quantified on the basis of weekly grab samples from the vent duct. In addition to the grab samples, the chart recorder on the CAM was observed for spikes or peaks that could represent short-term releases over and above that quantified from the grab samples. Following replacement of the CAM with the SPING-4, the CAM could no longer be used to quantify short-term releases. The data from the SPING-4 is retained in such a form that it did not lend itself to quantification of short-term releases. Therefore, the licensee modified the practice by reviewing the recorded data of the G-M monitors for spikes or peaks. However, due to the relatively high background and insensitivity of these monitors, spikes can only be identified with unusually large noble gas releases and in practice have not been observed. Also, when venting or purging the drywell, which normally exhausts via the reactor vent stack, the licensee's normal practice is to collect samples of iodine and particulate before the release to evaluate dose consequences of the release. However, no grab samples are collected for noble gas from which noble gas releases could be quantified for venting and purging of the drywell. The quantification of noble gases from the reactor building vent was discussed at the exit and will be reviewed during a subsequent inspection (Open Item 254/86012-01; 265/86011-01).

In early 1986, the licensee obtained improved equipment for obtaining liquid samples from gaseous effluent pathways for use in quantifying tritium effluents. The dry ice and glycol trap has been replaced by a small refrigeration unit which is more efficient during periods of low humidity. This improvement was made in response to a situation where a required monthly grab sample was not obtained in December 1985 from the

Unit 2 reactor building vent stack for analysis of tritium in gaseous effluent. The missed sample was due in part to failure to obtain a liquid sample when attempted due to the technique and the low humidity at the time. (A citation regarding the sample failure was made by the NRC resident inspectors in Inspection Report No. 265/86002 and has been closed by the resident inspectors.)

During the previous liquid and gaseous radwaste inspection, the inspector had suggested that data provided in the semiannual effluent report be given a more thorough review before publication owing to inspector identification of several minor errors in recent reports. Licensee personnel stated that since that time, data has been reviewed more thoroughly. The inspector identified no errors in the review of effluent reports during this inspection.

In 1985, about 3,000 curies of noble gas and about 4.9 E-2 curies of I-131 were released in gaseous effluents from both units combined. This represents about a 50% decrease in noble gas activity from the 6,000 curies released in 1984 and it represents about a 9% increase in I-131 activity from the 4.5 E-2 curies released in 1984.

No violations or deviations were identified.

4. Liquids and Liquid Radioactive Wastes

The inspector selectively reviewed the licensee's reactor liquids and liquid radwaste management program, including effluent records and semiannual effluent reports, for calendar year 1985 and the first five months of 1986.

The licensee's liquid radwaste system, instrumentation, controls and release path are basically unchanged from that described in Inspection Reports No. 254/85021 and No. 265/85024.

In 1985, about 1.5 curies of gross beta-gamma activity (excluding tritium) and about 3.4 curies of tritium was released in liquid effluents from both units combined. Although this represents about a 37% decrease in tritium activity from the 5.4 curies released in 1984, it represents about a twentyfold increase in gross beta-gamma activity (excluding tritium) from the .073 curies released in 1984. The large increase in beta-gamma activity in liquid releases was attributable to a single event in December 1985. Sodium hypochlorite is used periodically as a biocide for algae control in the main condenser. The piping system for its introduction also has a header to permit use of this corrosive chemical in the RHR heat exchangers for the same purpose although it has not been used in that system to date. On December 6, 1985, while introducing the chemical to the Unit 1 main condenser, a leak developed in the dead-headed line to the Unit 1 RHR system due to the chemical getting underneath the liner of the pipe (lined pipe used for corrosive

chemicals) at a flange located in the turbine building. The leak was located and isolated. The sodium hypochlorite collected in the turbine building equipment drain sump and the turbine building floor drain sump where the chemical acted as a decontamination agent solubilizing long lived activity collected in the sump surfaces, mainly Cs 137 (about 80%) with lesser amounts of Cs 134 (about 10%), Sr 89 and 90, Fe 55 and Co-60. Approximately 71,000 gallons of liquid waste was generated. This liquid was filtered which provided little reduction in activity. Due to the chemical nature of the liquid, attempts to process the liquid waste with resin resulted in quick depletion of the resin with little reduction in activity. The liquid was released in two separate batches from the River Discharge Tank, the normal liquid radwaste release path, on December 11 (33,000 gallons) and December 20 (38,000 gallons). The maximum concentration in the tank (the latter release) was about 610 MPC and after dilution was less than 0.1 MPC.

Owing to the 1985 liquid effluent releases, the calculated maximum whole body dose and maximum organ dose to any individual beyond the site boundary were 1.0 E-0 mrem and 1.5 E-0 mrem (liver), respectively, for Unit 1 and 4.0 E-3 mrem and 1.4 E-2 mrem (bone), respectively, for Unit 2, all well within applicable limits.

Three activities during the Unit 1 refueling outage (which began on January 6, 1986) with a relation to liquid effluents included decontamination of both recirculation and cleanup piping, plugging of about 20 main condenser tubes and identification and replacement of a leaking fuel rod. No significant problems were encountered with the decontamination effort and the removed activity was collected on resins and handled as solid radwaste. Slight increases in late December 1985 in both conductivity and chloride concentration of reactor water (but well within technical specification criteria) provided evidence of minor tube leaks in the main condenser. About 20 condenser tubes were identified with minor leaks and were plugged during the outage. No tube leaks have been evident in the new cycle which began April 7. During the latter part of the previous Unit 1 cycle, evidence of a minor fuel cladding leak was indicated by an increase (maximum of about 2.0 E-2 uCi/ml) in the dose equivalent I-131 concentration during shutdown and depressurization but well below the 5 uCi/ml technical specification steady state limit. Also, the noble gas concentration at the recombiner showed a modest increase but no increase in noble gas concentration was detectable at the release point (stack). The fuel bundle involved was identified during the outage by fuel sipping. A camera inspection of the fuel bundle then identified the defective end cap seal on a fuel rod. The rod was replaced and no further evidence of fuel cladding leaks has been evident during the new cycle .

No violations or deviations were identified.

5. Coolant Chemistry and Radiochemistry

The inspector selectively reviewed the licensee's reactor coolant chemistry and radiochemistry results for the last six months of 1985 and the first four months of 1986 to determine compliance with technical specification 3/4.6.C.1-5 requirements for chemistry and radiochemistry limits and surveillance frequencies. The inspector reviewed data for conductivity, chloride and dose equivalent I-131. The selective review and discussion with licensee personnel indicated that all parameters remained less than applicable technical specification limits throughout the review period. As noted in Section 4, small increases (but remaining well within limits) were noted late in last cycle of Unit 1 in both conductivity and dose equivalent I-131 attributable to identified and repaired condenser tube leaks and a fuel rod end cap leak, respectively. No problems were identified regarding compliance with frequency of required surveillances.

No violations or deviations were identified.

6. Calibrations and Functional Tests of Gaseous and Liquid Process and Effluent Monitors

The inspector reviewed records for three liquid system discharge monitors (Unit 1 and 2 service water monitors and the common radwaste discharge monitor) and for six gaseous system discharge monitors (three associated with chimney releases and three associated with reactor building vent releases). The inspector reviewed 18 month calibration and quarterly functional tests for the liquid and gaseous effluent monitors described above since July 1, 1985. The review showed proper calibrations and functional tests on a timely basis for operable monitors. Setpoints were also selectively reviewed and appear to be conservatively established.

As noted in previous Inspection Reports No. 254/85021 and No. 265/85024, new side stream monitors (with increased sensitivity) for both liquid radwaste and service water effluents were initially intended to be installed and operational on December 19, 1984, when the RETS technical specifications became effective. However, delays ensued when it was learned that the new monitors were not readily compatible electronically with certain portions of the previous monitoring system which were intended to be used with the new system. As noted in Section 2 of this report, electronic spiking problems were encountered with the service water monitors after they were initially declared operable. The licensee has again declared both service water monitors operable after identification of many sources of electronic spikes and installation of electronic spike suppression devices. The licensee plans to continue close observation of the service water monitors for any additional indication of spikes which are not valid detector signals.

Similar electronic spiking problems were encountered with the new radwaste monitor (an identical type monitor) after it was initially declared operable on February 21, 1986. This monitor is not currently operable. Operability/reliability aspects of these monitors was discussed at the site exit meeting on June 5 and was again the topic of discussion during the June 17, 1986, exit telephone conversation. This matter will be reviewed during a future inspection (Open Item 254/86012-02; 265/86011-02).

7. Procedures for Controlling Releases

The inspector selectively reviewed revisions to the licensee's radwaste procedures. No significant problems were identified during the following procedures review.

QCP 200-1, Revision 4, Reactor Water Iodine Analysis
QCP 300-2, Revision 10, Radioactive Liquid Discharge Batch Analysis
QCP 300-S2, Revision 3, Radwaste Liquid Effluent Monitor Alarm Setpoint
QCP 800-13, Revision 2, Tritium Sample Preparation
QCP 1520-8, Revision 1, Radioactive Waste Shipment Tracking

8. Air Cleaning Systems

Technical specifications require testing of the standby gas treatment system (SGTS), a safety-related system. Although not required by technical specification, the licensee also routinely tests the reactor control room HVAC system, a safety-related system for which a technical specification submittal for testing has been made, and three non-safety-related systems. The non-safety-related systems are the Technical Support Center HVAC system and both the Unit 1 and Unit 2 High Radiation Sample System HVAC systems. The in-place leakage test criteria specified both for DOP testing of HEPA filters and for Freon testing of charcoal adsorbers is $<$ one percent. The laboratory test criteria for carbon sample removal efficiency for radioactive methyl iodide is $>$ 90%. Records reviewed showed that the SGTS ventilation system successfully met test criteria when tested in December 1985. The other systems are tested to the same criteria. A selective review of the test data showed these systems had been tested within the past six months and met the test criteria. Surveillances reviewed met required frequency criteria.

No violations or deviations were identified.

9. Audits

The inspector reviewed one Quality Assurance audit conducted by an offsite group and two Quality Assurance surveillances conducted by inhouse QA personnel since July 1, 1985, involving, in part, the gaseous and liquid radwaste processing and effluent programs. Offsite Audit 04-85-II, an audit of technical specification adherence by the chemistry and health physics groups, conducted October 29 through November 1, 1985, reviewed the following requirements.

- Dose projected every 31 days per ODCM and Technical Specification 4.8.A.4.

- Baseline plot every eight hours of recombiner outlet temperature versus reactor power to assure no explosive gas mixture, as required by Technical Specification 4.8.A.5.

- Dose for nearest community drinking water computed every 92 days in accordance with ODCM.

- Reactor coolant samples are collected and analyzed for I-131 through I-135 every 96 hours during power operation.

No problems were identified with this area of the audit.

In addition, the inspector reviewed two 1986 plant QA Surveillance Reports conducted on February 19 and March 11 involving sampling and analysis of Unit 1 and Unit 2 service water system outlet and the "B" Floor Drain Sample Tank. Areas reviewed included:

- Samples collected and analyzed at required frequency.

- Obtained and followed current revision of procedures and forms.

- Proper radiological practices followed.

- Verified sample lines and sample containers clearly labeled and clean.

- Proper data recorded on forms.

No problems were identified in this area by these QA surveillances.

No violations or deviations were identified.

10. Training and Qualification Effectiveness

No batch liquid releases were made during the inspection. Therefore, the inspector did not have an opportunity to observe preparations and procedure adherence for a release.

In the chemistry department, one of the six chemist positions (including the Lead Chemist) has been vacant for about a month. The chemist, formerly in the position, transferred to the training department to assist in developing training for new chemists, health physicists, technical staff engineers and for RCT retraining. RCT retraining was implemented in 1985. The On-Job-Training Manual which requires demonstration of proficiency in an extensive list of job functions in chemistry, radiochemistry and radiation protection has now been implemented. Much of the foregoing effort was directed to achieving INPO accreditation.

Five radwaste foremen supervise operators involved with liquid processing and radwaste release. Operator training involved classroom training, followed by OJT, followed by more classroom training and a written exam. Operators' activities are closely supervised by radwaste foremen. Training appears adequate and personnel interviewed stated that operator training in all areas had improved in the last 1 - 1½ years.

Supervisory personnel interviewed by the inspector appeared to have a good understanding of their areas of responsibilities.

No violations or deviations were identified.

11. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open items disclosed during the inspection are discussed in Paragraphs 3 and 6.

12. Exit Meeting

The inspector met with licensee representatives (denoted in Section 1) at the conclusion of the site inspection on June 5, 1986. The subject of operability/reliability of the new service water and liquid radwaste monitors was again discussed during a subsequent telephone conversation with licensee representatives on June 17, 1986. The inspector discussed the likely information content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify such documents/processes as proprietary. The inspector summarized the scope and findings of the inspection. In response to certain items discussed by the inspector, the licensee:

a. Acknowledged the inspector's concern regarding the licensee's current practice for quantifying short-term noble gas releases via the reactor vent duct. This practice is based on the review of monitor charts for spikes. The charts currently reviewed are those from relatively insensitive monitors with G-M tubes located in the reactor vent ducts. The licensee agreed to evaluate current practice and to make necessary modifications if necessary (Section 3).

b. Acknowledged the inspector's concern regarding problems with operability/reliability of the two service water and the liquid radwaste monitors. The licensee assured the inspector that the electronic spike suppression devices were installed only on components such that valid detector signals would not be suppressed. The licensee has a goal of July 31, 1986, for operability of the radwaste monitor. The licensee's stated goal is to modify all three monitor systems to eliminate the need for the suppression devices. It is currently believed that this can be accomplished by a major modification involving a rerouting of

conduit to separate power cables from signal cables on all three monitors. A decision will be made in the next few weeks whether this modification can truly resolve the problems with the monitors or whether a new system may be required. If the former conclusion is made (as is currently anticipated), the licensee has set a goal for completion by December 31, 1986. Further, the licensee has agreed to notify RIII if it becomes apparent that either of these dates cannot be met. Resolving operability/reliability of these monitors has been given top priority by both the Technical Staff Supervisor at the plant and by SNED at corporate (Section 6).