U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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| Docket Nos: | 50-254; 50-265 |
| License Nos: | DPR-29; DPR-30 |
| Report Nos: | 50-254/98002(DRS); 50-265/98002(DRS) |
| Licensee: | Commonwealth Edison Company |
| Facility: | Quad Cities Nuclear Power Station<br>Units 1 and 2 |
| Location: | 22710 206th Avenue North<br>Cordova, IL 61242 |
| Dates: | January 12-16, 1998 |
| Inspectors: | R. Paul, Senior Radiation Specialist<br>W. Slawinski, Senior Radiation Specialist<br>K. Lambert, Radiation Specialist |
| Approved by: | Gary L. Shear, Chief, Plant Support Branch 2<br>Division of Reactor Safety |

## EXECUTIVE SUMMARY

Quad Cities Nuclear Power Station, Units 1 & 2
NRC Inspection Reports 50-254/98002; 50-265/98002

This routine inspection included a review of ALARA planning, radiation work permits, and observations of radworker performance. In addition, the inspection included a review of posting and labeling, portable instrument calibrations, tool issuance and control, and the review of a 1996 release of construction material off-site with direct radiation measurements greater than background.

- Q1P01 outage ALARA plans and radiation work permits were comprehensive and observed radiation worker practices were good. However, an inconsistency was identified in that ALARA initiatives were not always listed in RWPs (Section R1.1).

- One violation was identified for face shields in contaminated areas that were not issued by the radiation protection department. In addition, the face shields were left on the floor of contaminated areas, which could lead to the contamination of individuals using those face shields (Section R1.2).

- A Non-Cited Violation was identified for allowing materials outside the radiologically posted area (RPA) with direct radiation measurements above background levels. The Licensee initiated prompt and extensive corrective actions once the contaminated material was identified outside the RPA (Section R1.3).

- Radiological controls for tools and equipment used in RPAs were generally effective. Routine tool crib and storage area surveys performed by the licensee and independent surveys performed by the inspectors during the inspection confirmed the effectiveness of the radiological controls for tools and equipment. A bar coding system was being developed to improve the accountability and tracking of tools (Section R1.4).

- The calibration and maintenance program for the portable instruments reviewed was sufficiently implemented. Several program weaknesses were identified by the inspectors, including poor response of some instruments at the lower end of their capability and the lack of a dedicated calibration crew. The poor response of instruments will be followed-up during future inspections (Section R2.1).

- The radiological posting of facilities and equipment was good. Radiological housekeeping was good, except in the Laundry-Tool Decon building maintenance shop. Labeling of containers was generally effective, with inspector identified deficiencies promptly corrected by radiation protection personnel (Section R2.2).

- The licensee was taking good corrective actions to bring the radioactive waste systems back to their normal flow paths and to reduce the number of outstanding work requests (Section R2.3).

Report Details

## IV. Plant Support

### R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 Unit 1 Outage Work control and ALARA Implementation

a. Inspection Scope (IP 83750)

The inspectors reviewed the radiological controls implemented and the as-low-as-reasonably-achievable (ALARA) goals for the Unit 1 surveillance outage (Q1F01). The inspectors also reviewed ALARA plans and radiation work permits (RWPs), and observed worker practices. The following high dose or potentially high dose jobs were observed in progress:

- Reactor core isolation cooling valve disassembly/repair/reassembly,
- Main condenser tube cleaning,
- Turbine bypass valves asbestos abatement,
- High pressure coolant injection steam valves repair,
- Waste collector pump and motor installation and alignment.

b. Observations and Findings

Based on the original scope of work, a refueling outage dose goal of 40 person-rem was projected. The actual outage dose was 22 person-rem as of January 21, 1998. Due to both units being shutdown, the scope of the outage was being expanded and radiation protection expected the dose goal to be exceeded. Radiation protection indicated that once the extent of the outage expansion was determined, a revised outage dose goal would be projected.

The inspectors reviewed ALARA plans and RWPs for several high dose jobs including: main condenser tube cleaning; turbine bypass valves asbestos abatement; Unit 1 safety relief valves repair/replacement; waste collector tank leak repair; and the Unit 1 drywell snubber inspections. ALARA plans and associated RWPs were comprehensive and included adequate ALARA initiatives, such as minimizing crew size, deconning and releasing areas from contaminated area status, and job specific instructions on lowering worker doses. However, the inspectors noted an inconsistency where ALARA initiatives were not always reflected in the RWPs. Radiation protection (RP) staff indicated that the ALARA initiatives were discussed with individuals during the pre-job briefings and inclusion in the RWP was not required by procedure. The staff also indicated that it planned to review the relationship between ALARA plans and RWPs, to ensure that information was effectively communicated to the workers.

The inspectors observed portions of the main condenser tube cleaning and noted that ALARA initiatives were properly implemented along with the specific instructions in the RWP. During a high pressure coolant injection steam line valve repair, good communication between the maintenance workers and radiation protection technicians was observed. Workers notified radiation protection when the contaminated area needed to be expanded to facilitate work on the valve, and then waited until a RPT

arrived to move the barriers. Radiation Protection was responsive in that a RPT arrived within a reasonable time and adjusted the contaminated area. The ALARA initiatives observed by the inspectors were, again, adequately implemented and dosimetry was worn on the thigh as required by the RWP. The inspectors also observed the alignment of the waste collector pump and motor in the basement of the radwaste building. Appropriate protective clothing was worn by the workers and dosimetry was placed on their heads in accordance with the RWP due to radiological hot spots in overhead piping. The inspectors also observed that workers moved to low dose waiting areas when possible.

c. Conclusions

Radiation worker practices during the Q1P01 surveillance outage were good. ALARA plans and RWPs were comprehensive. However, an inconsistency was identified in that ALARA initiatives were not always listed in the RWPs.

R1.2 Issuance and Control of Face shields

a. Inspection Scope (IP 83750)

The inspectors reviewed the station procedures for the issuance and control of faceshields, observed the use of faceshields, and discussed the program with radiation protection personnel.

b. Observations and Findings

Station Procedure QCRP 5310-04, "Issuance and Maintenance of Faceshields" stated that faceshields used for protection from radiation or used in contaminated areas were issued by radiation protection and were to be treated in the same manner as respiratory equipment. Faceshields used for other purposes were issued from the tool cribs.

During a general inspection of the reactor building, the inspectors identified three faceshields left in the posted contaminated area of the Unit 2 decon shop. The inspectors informed radiation protection, who sent a RPT to investigate the situation. The RPT found five faceshields in the contaminated area of the decon shop, removed them for deconning and return to the tool crib, and initiated a problem identification form (PIF), PIF Q1998-00142. A smear survey of the faceshields did not identify any smearable activity. Further investigation, by radiation protection, revealed the faceshields were issued from the tool crib and should not have been in the contaminated area. The failure of faceshields, used in contaminated areas, to be issued by radiation protection was a violation of Technical Specification 6.11 and procedure QCRP 5310-04 (VIO 50-254/98002-01(DRS); 50-265/98002-01(DRS)).

During an inspection of the radwaste building, the inspectors also identified a faceshield lying on the floor of a posted contaminated area. While this faceshield was issued by radiation protection, the inspectors discussed with the RP staff the potential for individuals becoming contaminated by wearing faceshields that were laying in contaminated areas. Radiation protection staff indicated it was their expectation that faceshields be treated like respirators and not left in contaminated areas. They also

indicated that they would review the issuance and control of faceshields to identify additional corrective actions that could be implemented.

c. Conclusions

One violation was identified for faceshields in contaminated areas that were not issued by radiation protection. In addition, faceshields left on the floor of contaminated areas could lead to personal contamination of individuals using those faceshields.

R1.3 Contaminated Material Released Offsite

a. Inspection Scope (IP 83750)

The inspectors reviewed a 1996 release of contaminated cement blocks offsite. The inspection included a review of the PIF, relevant procedures, and discussions with radiation protection personnel.

b. Observations and Findings

In July 1996, a contract RPT (CRPT) was surveying, for unconditional release, cement blocks that had been used for shoring office trailers. The CRPT identified 10 blocks with direct measurements up to 5000 disintegrations per minute (dpm) outside the radiologically posted area (RPA) at the north end of the protected area. Smearable contamination was not identified. The licensee generated a PIF and initiated an investigation. The investigation revealed that the blocks came from an area outside the protected area, but inside the owner controlled area. There were approximately 2000 blocks in this area. Subsequent random surveys of these blocks, which originally came from the RPA, revealed several blocks with direct fixed contamination ranging from 1000 to 30,000 dpm, with no smearable activity identified. The area was then controlled and posted as a radioactive material area. The blocks were transported back to the Dry Active Waste storage building and other areas in the owner controlled area were searched for additional blocks.

Radiation protection supervision was informed that some blocks had been taken offsite by employees. The licensee ran an article in the daily news letter informing employees of the event and asked that anyone who had taken blocks from the site contact radiation protection so that surveys of the blocks could be performed. However, additional information was not obtained. RPTs were sent to four employees' homes where blocks had been taken. Surveys of approximately 500 blocks at employees' homes did not identify any direct measurements or smearable contamination, except at the home of one RPT. Three blocks out of 225 blocks at the RPT's home were identified with direct measurements ranging from 1000 to 10,000 dpm, with no smearable activity identified. All blocks with identified contamination were transported back to the station.

The licensee did not find a conclusive cause to the event, but indicated that contamination could have been missed during unconditional release surveys or that a pallet of contaminated blocks had been mistakenly taken to the area with a load of noncontaminated blocks. The radiological significance of the event was minimal as no personnel contamination events occurred as the result of this event.

The inspectors reviewed Procedure QCAP 0600-01, "Control of Materials for Unconditional Release From Radiologically Posted Areas," which stated that the release limits were no direct or smearable contamination above background. The release of blocks with direct measurements above background was a violation of procedure QCAP 0600-01. This licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy.

c. Conclusions

A Non-Cited Violation was identified for allowing materials outside the RPA with direct measurements above background. The licensee initiated prompt corrective actions once contaminated material was identified outside the RPA.

R1.4 Issuance and Control of Tools Used in Radiologically Protected Areas

a. Inspection Scope

The inspectors reviewed the licensee's program for the issuance and radiological control of tools and equipment used in radiologically protected areas (RPAs). The review consisted of in-plant observations, independent inspector survey of tools and other items, review of the tool survey program, and discussions with workers.

b. Observations and Findings

Small tools and other equipment belonging to the station and used in RPAs were issued primarily from the tool crib located in the turbine building (i.e contaminated tool crib) or, if necessary, the clean tool crib in the service building. Instrument maintenance (IM) and electrical maintenance (EM) staffs also maintained tools in gang boxes and cabinets located in various areas of the plant.

Tools were surveyed by radiation protection personnel after use in contaminated areas and released for return to the tool crib or other storage area provided fixed contamination was less than 50,000 dpm and no removable contamination was detected. Tools and equipment with fixed contamination were identified by magenta colored paint. Tools found to exceed the release criteria were transferred either to the Laundry-Tool Decon (LTD) building or Unit-2 decontamination shop, and decontaminated prior to return to the tool crib or other plant storage area.

The RP department performed routine weekly surveys of hand tools and other equipment stored in the turbine building (contaminated) tool crib, and monthly surveys of the mechanical maintenance (MM) (clean) tool crib and the IM and MM (contaminated) tool rooms in the service building. Tools stored in gang boxes and cabinets in various plant areas were also randomly surveyed by RPTs monthly. Approximately 10% of the tools stored in the tool crib were randomly surveyed in accordance with station procedure QCRP 6020-03, Revision 8, "Radiological Surveys." The licensee's surveys occasionally identified fixed contamination on individual tools above the 50,000 dpm release criteria; however, the contamination was usually isolated to a very small area of the tool and typically in tool crevices and other difficult to survey locations. The licensee attributed the isolated contamination to the thoroughness of the surveys after decontamination. Removable contamination was rarely identified on tools and other

items stored in the tool cribs, tool rooms or gang boxes and cabinets located throughout the plant.

Inspector review of the weekly and monthly survey results in the contaminated tool crib and tools stored in gang boxes and cabinets identified no problems. Independent inspector measurements of randomly selected tools and equipment maintained in the turbine building tool crib and in gang boxes and storage cabinets in the LTD and reactor buildings confirmed the adequacy of the licensee's radiological control of tools used in RPAs.

The licensee currently has no accountability system to track the issuance and return of tools used in RPAs and non-RPAs. Specifically, no mechanism was in place for assignment of tools issued from a tool crib to an individual or group, for tracking them to ensure surveys were completed, for decontamination if required, and for return to the appropriate storage area after use. Although the lack of a tool accountability and tracking system had not adversely impacted the radiological control of tools, the licensee recognized the benefits of improved controls. A bar code tracking system was being developed for tools and equipment, which the licensee planned to implement in 1998.

c. Conclusions

Radiological controls for tools and equipment used in contaminated areas were generally effective. Tools were surveyed after use in an RPA and decontaminated, as necessary, prior to return to a tool crib or other tool storage area. Routine tool crib and storage area surveys performed by the licensee, and independent surveys performed by the inspectors during the inspection confirmed the effectiveness of the radiological controls for tools and equipment. A bar coding system was being developed to improve the accountability and tracking of tools.

**R2 Status of RP&C Facilities and Equipment**

R2.1 Radiation Monitoring Equipment and Facilities

a. Inspection Scope (IP 83750)

The inspectors reviewed the operation and calibration methodology for the portable beta-gamma monitoring equipment. The inspectors walked down the calibration facility and equipment, observed radioactive source condition, compared results from an independent source check of certain instruments to the licensee's results, and reviewed selected procedures, detector operability history data, and other calibration and test results.

b. Observations and Findings

Calibration and instrument tests were performed as required, and equipment was as described in the FSAR. The portable monitoring/survey equipment consisted mainly of Geiger-Mueller (GM) and ion chamber detectors. In general, calibration and test methodology was technically sound for all portable monitoring equipment reviewed during the inspection. Most detectors were calibrated and tested by the licensee,

however, neutron and alpha detection equipment, and air sampling equipment was calibrated by a vendor. There was no dedicated group of calibration technicians and calibrations were performed by RPTs who frequently rotate through the calibration facility. One problem caused as a result of this practice was lack of ownership. The lack of ownership may have been reflected in the inspectors observations that several beta standards used for calibration of hand held GM detectors were in poor physical condition, which was not reported by the technicians. The degraded standards were not used to calibrate instruments used to quantify radioactive material on tools and equipment for unconditional release; however, other in-plant assessments were performed using the detectors calibrated using those sources. The licensee stated that these standards would be replaced with new ones.

The calibration procedures for all portable hand held instruments had been recently upgraded. However, the inspectors identified a weakness with the procedures in that they did not address the actions that should be taken when the "as found" results are outside the acceptable tolerance limits indicated in the procedures. The current practice was to adjust the "as found" reading on the detector and to the midpoint of the expected reading without documenting that the "as found" reading was outside the tolerance limits. Without documentation, there was no mechanism to track degraded detector performance over time. The inspectors also independently used different strength calibration standards to check several GM detectors' calibrations, and found they responded as expected on all but the lowest range of each instrument.

The condition of calibration standards, and the "as found" readings of instruments being found outside of tolerance limits were discussed with the radiation protection manager and his staff who indicated they would perform an evaluation to determine the scope of the problem and take corrective actions where necessary. The NRC will follow-up this matter during future inspections (IFI 50-254/98002-03(DRS); 50-265/9802-03(DRS)).

c. Conclusions

The calibration and maintenance system for those instruments reviewed was sufficiently implemented. However, the inspectors identified calibration procedural weaknesses, poor response of some detectors at the lower end of the detector's capability, and lack of a dedicated calibration crew,

P2.2 Radiological Posting and Labeling of Facilities and Equipment

a. Inspection Scope (IP 83750)

The inspectors performed several inspections of the reactor, turbine, and Laundry-Tool Decon (LTD) buildings, including the Unit 1 and Unit 2 corner rooms and torus general areas.

b. Observations

The inspectors noted that the entrance to the radiologically posted area (RPA) was posted as a radiation area. Areas in the RPA with elevated dose rates were identified by diamond signs that indicated dose rates were either 0-5, 5-25, or greater than 25 milliroentgen per hour (mR/hr). The inspectors noted this was effective in informing

workers of the dose rates in areas they were working. Radiation protection staff had posted several preferred routes in the reactor building to direct individuals around areas with higher dose rates. High radiation areas and locked high radiation areas were observed as being properly posted and controlled. The inspectors independently verified that radiological postings reflected the actual area radiological conditions.

Radiological housekeeping in the reactor, turbine, and LTD buildings was generally good However, the housekeeping of the LTD building maintenance shop was poor, which has been a continuing problem. The housekeeping issue in the maintenance shop was brought to the attention of radiation protection who took action to remedy the situation. The inspectors noted during an inspection of the LTD building later in the week, that the housekeeping in the maintenance shop was improved.

Labeling of containers throughout the RPA was generally good. The inspectors identified a few minor labeling inconsistencies, such as empty containers with labels and containers with labels that did not contain all appropriate information. Radiation protection personnel promptly corrected the labeling inconsistencies after being notified. Cabinets, tool boxes, and gang boxes containing tools or equipment were posted as "radioactive material. tools and equipment." Radiation protection management was questioned why no radiological information was present on the labels and responded that tools in use had less th 50,000 dpm direct activity with no smearable activity and workers were aware of the limits. The inspectors questioned several workers on the acceptable radiation limits for tools, with only one worker correctly identifying the limits. Radiation protection management was informed of the workers response to the inspectors questions. They indicated that radiological information would be added to the labels and that workers would be reinformed of the radiological limits for tools.

c. Conclusions

The radiological posting of facilities and equipment was effective. Radiological housekeeping was good with the exception of the LTD maintenance shop, which was effectively addressed by the licensee. Labeling of containers was generally effective, with the inspector identified deficiencies promptly corrected by radiation protection personnel.

R2.3 Radwaste Equipment Initiatives

a. Inspection Scope (IP 84750)

The inspectors reviewed the initiatives underway in radwaste to bring the floor drain and waste collector systems back to normal processing flow paths

b. Observations

The inspectors reviewed a list of the top eight work requests, which were needed to achieve separate flow paths for the floor drain and waste collector systems. Currently, one system can be operated at a time as the only operable pump and filter are the ones shared by the systems. Upon completion of the eight work requests, both systems would be available in addition to the shared backup pump and filter. The radwaste coordinator indicated that work had begun on the requests and discussions were

ongoing regarding a revised, more timely work schedule for completion of the eight priority work requests while both units were shutdown. The current schedule indicated the majority of the work would be completed in March 1998, with one valve not schedule for repair until June 1998.

The coordinator was also prioritizing the remaining radwaste work requests with the primary goal of repairing operating equipment and abandoning old equipment. This would include electrical work, lighting issues, leaking valves, and breakers that periodically trip. Once prioritized, a work schedule was to be developed.

c. Conclusions

The licensee was taking good corrective actions to bring the radwaste systems back to their normal flow paths and reduce the number of outstanding work requests.

## X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on January 16, 1998. The licensee acknowledged the findings presented.

The licensee did not identify any information discussed as proprietary.

## PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Baumer, Regulatory Assurance
A. Chernick, Regulatory Assurance Supervisor
D. Cook, Plant Manager
D. Kallenbach, Radiation Protection Scheduler
T. Kirkham, Lead Health Physicist-Technical
E. Kraft Jr., Site Vice-President
L. Pearce, General Plant Manager
G. Powell, Radiation Protection Manager
W. Schmidt, ALARA Coordinator

NRC

L. Collins, Resident Inspector
K. Walton, Resident Inspector

## INSPECTION PROCEDURES USED

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| IP 83750 | Occupational Radiation Exposure |
| IP 84750 | Radioactive Waste Treatment, and Effluent and Environmental Monitoring |

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

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|---|---|---|
| 50-254/265-98002-01 | VIO | Failure of Radiation Protection to issue faceshields used in contaminated areas. |
| 50-254/265-98002-02 | NCV | Release of material outside the RPA with direct radiation measurements above background. |
| 50-254/265-98002-03 | IFI | The condition of portable instrument calibration standards and the "as found" readings of portable instruments with G-M detectors being outside tolerance limits during calibrations. |

Closed

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| 50-254/265-98002-02 | NCV | Release of material outside the RPA with direct radiological contamination above background. |

## USED LIST OF ACRONYMS

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|---|---|
| ALARA | As Low As Reasonably Achievable |
| CRPT | Contract Radiation Protection Technician |
| dpm | disintegrations per minute |
| FSAR | Final Safety Analysis Report |
| GM | Geiger-Mueller |
| LTD | Laundry-Tool Decon |
| mR/hr | milliroentgen per hour |
| NCV | Non-Cited Violation |
| NRC | Nuclear Regulatory Commission |
| PIF | Problem Identification Form |
| RP | Radiation Protection |
| RPA | Radiologically Posted Area |
| RPT | Radiation Protection Technician |
| RWP | Radiation Work Permit |
| VIO | Violation |

## LIST OF DOCUMENTS REVIEWED

ANSI, N323-1978, Radiation Protection Instrumentation Test and Calibration

QCAP 0600-01, Revision 1, Control of Materials for Unconditional Release From Radiologically Posted Areas

QCAP 0600-04, Revision 1, Exit Authorization for Vehicles and Materials From the Protected Area

QCRP 0300-07, Revision 3, DAM 4/3 Calibration

QCRP 0600-04, Revision 1, ALARA Action Reviews

QCRP 5010-01, Revision 7, Radiological Posting & Labeling Requirements

QCRP 5310-04, Revision 4, Issuance & Maintenance of Face shields

QCRP 5500-1, Revision 3, Respiratory Protection Program Administrative Guide

QCRP 6200-05, Revision 1, Writing Radiation Work Permits

PIF 96-2371, Uncontrolled Radioactive Material - Cement Blocks

PIF Q1998-00142, Five Face shields Found in Contaminated Area

Radwaste Top 8 Work Requests

RWP #: 983250, Revision 0, 0-2006 Waste Collector Pump: Repair Pump/Coupling/VIBS

RWP #: 981033, Revision 0, 1-1301-16 Valve: Disassemble/Repair/Reassemble/Test

RWP #: 980031, Revision 1, U-1 3301 Main Condenser: Tube Cleaning

RWP #: 981020, Revision 0, U1 ERV/SRV/Target Rock Valves: Repair/Replace

RWP #: 983064, Revision 1, U1 Turbine Bypass Valves: Asbestos Abatement

RWP #: 981030, Revision 0, U1 Snubbers: Drywell Inspection/Replacement

RWP #: 983025, Revision 0, Rad Waste Collector Tank Leak Repair