

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-254/84-10(DRSS); 50-265/84-09(DRSS)

Docket Nos. 50-254; 50-265

Licenses No. DPR-29; DPR-30

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

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

Inspection at: Quad-Cities Site, Cordova, IL

Inspection Conducted: June 25-28, 1984 and July 6, 1984

S. Rozak
Inspectors: S. Rozak

7/25/84
Date

M. Schumacher for
M. J. Oestmann

7/25/84
Date

M. Schumacher
Approved By: M. C. Schumacher, Chief
Independent Measurements and
Environmental Protection Section

Inspection Summary

Inspection on June 25-28 and July 6, 1984 (Reports No. 50-254/84-10(DRSS);
50-265/84-09(DRSS))

Areas Inspected: Routine, unannounced inspection of: (1) Confirmatory measurements, including sampling, laboratory quality control, and comparison of licensee analysis results with those of the Region III mobile laboratory and the NRC Reference Laboratory; (2) radiological environmental monitoring program (REMP) including program management, quality control, and implementation; and (3) licensee actions taken on open items identified in previous inspections. The inspection involved 49 inspector-hours onsite by two NRC inspectors.

Results: No violations or deviations were identified during this inspection.

DETAILS

1. Persons Contacted

- *T. Tamlyn, Assistant Superintendent for Operations, QCNPS
- *T. Kovack, Rad Chem Supervisor, QCNPS
- *J. Sirovy, Lead Chemist, QCNPS
- *R. Carson, Lead Health Physicist, QCNPS
- P. Behrens, Chemist, QCNPS
- R. Hebler, Foreman, QCNPS
- J. Wethington, Quality Assurance Engineer, QCNPS
- G. Powell, Health Physicist, QCNPS
- **W. Walschot, Group Leader, Chemical Engineering Services Group, CECO

The inspectors also interviewed several other licensee personnel during the course of the inspection, including chemical and health physics personnel.

*Denotes those present at exit interview on June 28, 1984.

**Telephone conversation on July 6, 1984.

2. Licensee Action on Previous Inspection Findings

- a. (CLOSED) Open Item (50-254/82-13-03; 50-265/82-15-03): Incorporation of multiplet analysis into AAIS. The licensee's corporate office has made several improvements to the Automated Analytical Instrumentation System (AAIS) including multiplet analysis. In addition analysts have been given more capability in evaluating the adequacy of AAIS results for gamma spectral analysis including spectrum recall and the ability to extract results manually. Additional training has also been provided in the use of AAIS. Corporate representatives stated that the last major revisions to AAIS were implemented two months ago. During this inspection these added capabilities were demonstrated in the course of performing split sample analysis. No problems were identified.
- b. (CLOSED) Open Item (50-254/83-21-02; 50-265/83-19-02): Completion and implementation of QC procedures for control of analytical measurements. Procedures QCP 1400-11, 'Verification of Analytical Performance' and QCP 1400-12, 'Quality Control Program for Chemical Instrumentation' have been approved and completely implemented in 1983. These documents are patterned after guidance in INPO procedures Cy-701 and Cy-702. The inspectors observed a noticeable improvement in QC practices based to some extent on implementation of these procedures. No problems were identified.
- c. (CLOSED) Open Item (50-254/83-21-03; 50-265/83-19-03): Investigate the performance of the Canberra Alpha/Beta Counters to verify accuracy. Report independent laboratory results or use of new instruments to Region III. The licensee investigated the performance of the Canberra Counters and made adjustments with the help of manufacturer representatives. In addition two Eberline SAC-4 Alpha Counters were purchased to supplement alpha counting capability, and additional alpha standards were purchased. These

instruments were included in an independent verification program with three other laboratories; Science Application Inc., Eberline, and U. S. EPA. Both the Canberras and the SAC-4s performed acceptably in these intercomparisons. These actions were documented in letters transmitted to Region III dated September 2, 1983 and May 22, 1984. No problems were identified.

- d. (CLOSED) Open Item (50-254/83-21-04; 50-265/83-19-04): Licensee agreed to repair any faulty flowmeters and regulators on the air samplers used in the radiological environmental monitoring program (REMP). The inspectors observed that during a tour of the air samplers in this inspection, new flowmeters had been installed on each air sampler and the regulators repaired. These air samplers are regulated constant flow devices and are checked monthly with a field calibration flowmeter by the sample collector for the licensee's contractor, Teledyne Isotopes, Inc.. No problems were identified.
- e. (CLOSED) Open Item (50-254/83-21-05; 50-265/83-19-05): Maintenance of the REMP air samplers needs improvement. During this inspection, the inspectors observed that the air samplers were operating properly and were calibrated. Review of the weekly data collection sheet indicated that each air sampler had been serviced during the past year. The licensee has provided instructions to the contractor sample collector to ensure adequate maintenance of air samplers on an annual schedule.
- f. (CLOSED) Open Item (50-254/83-21-06; 50-265/83-19-06): Licensee agreed to revise instructions on locating environmental sample stations. During this inspection the inspector reviewed Procedure QEP 450-1 Revision 3, May 1984 "Environmental Surveillance Stations" which includes instructions as to the location of each REMP air sampling stations. No problems were identified.

3. Management Controls, Organization, Training and Qualifications

The inspectors reviewed the licensee's management controls for implementation of the requirements of the REMP. In accordance with an internal memo signed by a Corporate Vice President and dated June 21, 1983, responsibilities for technical review of REMP data, managing and implementing the REMP are under the Supervisor of Emergency Planning, located in the licensee's corporate office. This supervisor administers the contract with Teledyne Isotopes, Inc., formerly Hazleton Environmental Sciences Corporation, who performs the sampling and analysis of environmental media. Plant personnel are responsible for review of the weekly sample data collection sheets to ensure samples are collected on schedule in accordance with T/S 4.8.F. The inspectors found that during review of these sheets for 1983 through 1984 to date, no signature of plant personnel such as the Lead Health Physicist or Rad Chem Supervisor was evident on these sheets. A health physicist stated that he reviews these sheets each week and checks off a monthly surveillance sheet but does not sign the sheets. The inspectors also reviewed procedure QRP 1720-1 Revision 1, dated December 1982. "Environmental Monitoring", which includes a description of the responsibilities of the

Rad Chem Supervisor regarding the REMP, including review and maintenance of REMP records. Licensee personnel agreed that these weekly collection sheets should be signed off by the appropriate management after a review has been performed. This item will be examined in a future inspection (Open Item 50-254/84-10-01; 50-265/84-09-01).

The organization and staffing of the chemistry group appears to meet the commitments of the updated FSAR. The Lead Chemist meets the qualifications of the position description required in ANSI/ANS 3.1-1978 and appears to have management support adequate to effectively meet plant chemistry requirements.

The training program for Rad-Chem Technicians (RCTs) was also reviewed and includes on the job experience and supervisory observation in accordance with QCP 1400-6 "On the Job Training for Radiation Chemistry Technicians", approved by the Quad-Cities Onsite Review Board (QCOSR) on July 30, 1982. The licensee currently has 29 RCTs who have met the qualifications according to Checklist QCP 1400-S6. The licensee plans to hire 6-7 new RCTs in the near future who will attend a fourteen week course in chemistry at the licensee's Braidwood Training Center. Topics covered in this course include generic RC training, chemistry/radiochemistry and reactor system training. The training program appears to be satisfactory.

No violations or deviations were identified.

4. Implementation of the Radiological Environmental Monitoring Program (REMP)

The inspectors reviewed the implementation of the REMP, including the environmental monitoring reports for 1983 and 1984 to date against the requirements in T/S 4.8.F. All required samples were collected and missing samples were accounted for. Except for one sample, no other problems were noted. This one exception involved an elevated gross beta activity of 1586 pCi/l in one liquid sample taken from the Spray Canal Blowdown and analyzed by the contractor. In accordance with T/S 4.8.F the contractor analyzed the same sample by gamma spectroscopy and found the major activity was due to Co-60 (1160 pCi/l). A split sample analyzed by the plant personnel indicated normal activity of 4 to 5 pCi/l. Investigation by the licensee showed that contamination of the sample container was the cause of the elevated activity.

A tour of several air sampling and TLD stations indicated no problems. All samplers were found operable and calibrated. In addition, no problems were identified in the contractor's internal QC program, or in the results of his participation in the EPA's cross check program for interlaboratory comparisons.

The inspectors also verified that an annual milch animal and nearest resident census was conducted in August 1983 in accordance with T/S 4.8.F. No dairy farms were found within a five mile radius of the

plant. Milk samples are collected from two dairy farms located 5.5 miles from the plant.

No violations or deviations were identified.

5. Implementation of Quality Assurance/Quality Control (QA/QC) Program

The inspectors reviewed the QA/QC program and procedures for laboratory equipment and analysis which include the following:

QCP 1400-11 Revision 1, April 1983 "Verification of Analytical Performance"
QCP 1400-12 Revision 3, February 1984 "Quality Control Program for Chemistry Instrumentation"
QCP 1400-S9 Revision 1, April 1983 "Laboratory Quality Sample Checklist"
QCP 1400-S10 Revision 1, April 1983 "Split Samples Program Checklist"
QCP 1400-S11 Revision 1, April 1983 "Precision Measuring Equipment Quality Checklist"

These procedures which were approved by the QCOSR are currently being implemented and were patterned after guidance in INPO procedures Cy-701 and Cy-702.

Selected chemistry procedures (QCPs) for various analyses and surveillances were found to be current. No technical problems were noted during a review of the procedures. These procedures were being implemented and analysis results documented on logsheets and also by means of a computer.

A tour of the cold and hot laboratory revealed no technical problems. Laboratory instruments were found operational and properly calibrated, except a new atomic absorption instrument which was undergoing testing. All counting room equipment appeared to be functional. The laboratories were clean and appeared well organized.

The licensee has made improvements in QC practices in the laboratories. Quality assurance and quality control appear to receive considerable attention. For example, all RCTs are required to perform analysis on an extensive series of blind samples, purchased from vendors, on a regular schedule; QC control charts are kept not only for counting instruments but also for instruments used in chemical analysis; inhouse computer programs are being developed to help control chemicals and reagent quality such as flagging any possible adverse effects on plant systems, shelf-life, associated hazards, etc; the licensee participates in inter-comparison programs with several laboratories.

No violations or deviations were identified.

6. Licensee Internal Audits

Two onsite QA and one offsite QA audit regarding chemistry and radiochemistry were performed by the licensee during 1983 and 1984 to date. One finding was identified in QA Audit No. QA04-83-6 (March 2, 1983) pertaining to utilizing the current worksheets and data forms to document analytical results for determining effluent releases. The licensee had been using out of date forms. This item was closed out on

April 12, 1983 when there was a complete conversion from the older forms to the new forms.

No findings were identified by the licensee during an adequate audit of the radiological environmental monitoring program on October 17, 1983.

No violations or deviations were identified.

7. Confirmatory of Measurement of Split Samples

Liquid, off gas, simulated effluent gas, air particulate filter, charcoal adsorber and reactor coolant samples were analyzed by the licensee, and by the NRC inspectors using the NRC mobile laboratory. Results for these comparisons are presented in Table I and the comparison criteria in Attachment 1. A split of the liquid waste sample to be analyzed by the licensee has been sent to the Radiological Environmental Sciences Laboratory, the NRC's Reference Laboratory. The licensee agreed to analyze this sample for H-3, gross beta, Sr-89, and Sr-90 and to report the results to Region III (Open Item 50-254/84-10-02; 50-255/84-09-02). Comparison of the results of these analysis will be included in an addendum to this report.

For thirty-nine comparisons the licensee had thirty-six agreements. The three disagreements were for comparisons on the licensee's effluent gas geometry. The comparison involved simulated samples made by injecting gaseous activity into a closed circulating system containing the NRC's and the licensee's sample containers in series. This was done because only extremely low levels of activity were present in real samples. In addition, comparison criteria were relaxed for a Xe-135 comparison in an off-gas sample due to known large systematic errors present using this geometry. The licensee does not use off-gas results to quantify effluent releases.

The cause of the disagreements for the effluent gas comparisons is likely due to errors in calibration. The licensee had attempted to calibrate this geometry (4.7 liter Marinelli beaker) with gas standards. In examining the subsequent calibration the licensee suspected that an incomplete transfer of gas had occurred from the standard thus invalidating the calibration. The licensee then attempted to perform an indirect calibration by using the off-gas geometry which had been calibrated using liquid sources corrected for self absorption. A sample was counted using the off-gas geometry in order to "standardize" the gas then an aliquot was injected into the Marinelli beaker. This indirect calibration is prone to large systematic errors which may account for the disagreements. The licensee's results are generally conservative. The licensee agreed to recalibrate this geometry as soon as a gas standard is available (Open Item 50-254/84-10-03; 50-265/84-09-03).

No violations or deviations were identified.

8. Exit Interview

The inspectors met with licensee representatives denoted in Section 1 on June 28, 1984, at the conclusion of the inspection. The scope and

findings of the inspection were discussed. In response to inspector comments, the licensee representatives agreed to the actions discussed in Section 3 and 7 of this report.

Attachments:

1. Table 1 Confirmatory Measurements
Program Results, 2nd Quarter 1984
2. Attachments 1 Criteria for
Comparing Analytical
Measurements

TABLE I

U S NUCLEAR REGULATORY COMMISSION
 OFFICE OF INSPECTION AND ENFORCEMENT
 CONFIRMATORY MEASUREMENTS PROGRAM
 FACILITY: QUAD CITIES
 FOR THE 2 QUARTER OF 1984

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC----		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
P FILTER	I-133	1.2E-04	7.7E-06	8.5E-05	0.0E-01	7.2E-01	1.5E 01	A
	SR-91	1.0E-03	7.8E-05	1.1E-03	0.0E-01	1.0E 00	1.3E 01	A
OFF GAS	KR-85M	6.9E-03	6.3E-05	8.0E-03	0.0E-01	1.2E 00	1.1E 02	A
	KR-87	4.1E-02	3.3E-04	5.1E-02	0.0E-01	1.2E 00	1.3E 02	A
	KR-88	2.5E-02	1.9E-04	3.0E-02	0.0E-01	1.2E 00	1.4E 02	A
	XE-133	2.8E-03	7.2E-05	3.3E-03	0.0E-01	1.2E 00	3.9E 01	A
	XE-135	4.1E-02	1.1E-04	5.0E-02	0.0E-01	1.2E 00	3.7E 02	A*
	XE-135M	2.3E-01	1.1E-02	2.6E-01	0.0E-01	1.1E 00	2.2E 01	A
	XE-138	1.1E 00	3.3E-01	1.1E 00	0.0E-01	1.0E 00	3.2E 00	A
L WASTE	MN-54	1.4E-06	1.8E-07	1.1E-06	0.0E-01	7.7E-01	8.0E 00	A
	CO-58	1.5E-06	1.5E-07	9.5E-07	0.0E-01	6.5E-01	9.7E 00	A
	CO-60	1.5E-05	7.9E-07	1.5E-05	0.0E-01	1.0E 00	1.9E 01	A
	ZN-65	9.2E-07	2.8E-07	5.9E-07	0.0E-01	6.4E-01	3.3E 00	A
	I-131	2.5E-07	7.0E-08	1.4E-07	0.0E-01	5.5E-01	3.6E 00	A
	CS-134	4.6E-07	1.0E-07	3.4E-07	0.0E-01	7.4E-01	4.5E 00	A
	CS-137	3.7E-06	1.7E-07	3.4E-06	0.0E-01	9.2E-01	2.1E 01	A
C FILTER	I-131	1.6E-04	1.7E-05	2.0E-04	0.0E-01	1.2E 00	9.5E 00	A
	I-133	7.4E-04	4.7E-05	7.6E-04	0.0E-01	1.0E 00	1.6E 01	A
PRIMARY	NA-24	3.9E-03	9.2E-05	3.9E-03	0.0E-01	1.0E 00	4.3E 01	A
	CR-51	2.2E-03	2.0E-04	2.6E-03	0.0E-01	1.2E 00	1.1E 01	A
	MN-56	2.4E-03	2.1E-04	3.6E-03	0.0E-01	1.5E 00	1.2E 01	A
	CO-58	2.7E-04	3.1E-05	2.9E-04	0.0E-01	1.1E 00	8.6E 00	A
	CO-60	4.0E-04	3.4E-05	4.2E-04	0.0E-01	1.1E 00	1.2E 01	A
	AS-76	4.1E-04	5.2E-05	4.1E-04	0.0E-01	9.9E-01	8.0E 00	A
	I-131	5.0E-04	3.2E-05	6.9E-04	0.0E-01	1.4E 00	1.6E 01	A
	I-132	1.4E-02	3.7E-04	1.8E-02	0.0E-01	1.3E 00	3.8E 01	A
	I-133	9.3E-03	9.0E-04	8.5E-03	0.0E-01	9.1E-01	1.0E 01	A
	I-135	1.8E-02	4.3E-04	2.0E-02	0.0E-01	1.1E 00	4.1E 01	A

T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

N=NO COMPARISON

* CRITERIA RELAXED

TABLE I
 U S NUCLEAR REGULATORY COMMISSION
 OFFICE OF INSPECTION AND ENFORCEMENT
 CONFIRMATORY MEASUREMENTS PROGRAM
 FACILITY: QUAD CITIES
 FOR THE 2 QUARTER OF 1984

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
PRIMARY	SR-91	6.9E-03	2.4E-04	7.1E-03	0.0E-01	1.0E 00	2.8E 01	A
	SR-92	1.8E-02	4.3E-04	1.8E-02	0.0E-01	1.0E 00	4.2E 01	A
	MO-99	1.7E-03	2.4E-04	2.2E-03	0.0E-01	1.3E 00	7.2E 00	A
	RU-105	1.3E-03	3.3E-04	2.0E-03	0.0E-01	1.6E 00	3.9E 00	A
	BA-140	5.3E-04	9.1E-05	4.8E-04	0.0E-01	9.1E-01	5.8E 00	A
	Y-92	1.3E-02	1.0E-03	1.2E-02	0.0E-01	9.2E-01	1.3E 01	A
GAS	XE-133	3.1E-06	6.1E-08	4.8E-06	0.0E-01	1.6E 00	5.0E 01	D
	KR-85M	8.2E-07	2.3E-08	8.7E-07	0.0E-01	1.1E 00	3.6E 01	A
	KR-88	1.3E-06	5.8E-08	1.5E-06	0.0E-01	1.2E 00	2.2E 01	A
	XE-135	1.2E-05	6.7E-08	1.6E-05	0.0E-01	1.3E 00	1.8E 02	D
	KR-87	2.5E-07	2.9E-08	1.4E-07	0.0E-01	5.7E-01	8.6E 00	D

T TEST RESULTS:
 A=AGREEMENT
 D=DISAGREEMENT
 N=NO COMPARISON
 * CRITERIA RELAXED

ATTACHMENT 1

CRITERIA FOR COMPARING ANALYTICAL MEASUREMENTS

This attachment provides criteria for comparing results of capability tests and verification measurements. The criteria are based on an empirical relationship which combines prior experience and the accuracy needs of this program.

In these criteria, the judgment limits are variable in relation to the comparison of the NRC's value to its associated one sigma uncertainty. As that ratio, referred to in this program as "Resolution", increases, the acceptability of a licensee's measurement should be more selective. Conversely, poorer agreement should be considered acceptable as the resolution decreases. The values in the ratio criteria may be rounded to fewer significant figures to maintain statistical consistency with the number of significant figures reported by the NRC Reference Laboratory, unless such rounding will result in a narrowed category of acceptance.

<u>RESOLUTION</u>	<u>RATIO = LICENSEE VALUE/NRC REFERENCE VALUE</u>
	<u>Agreement</u>
<3	No Comparison
<u>≥</u> 3 and <4	0.4 - 2.5
<u>≥</u> 4 and <8	0.5 - 2.0
<u>≥</u> 8 and <16	0.6 - 1.67
<u>≥</u> 16 and <51	0.75 - 1.33
<u>≥</u> 51 and <200	0.80 - 1.25
<u>≥</u> 200	0.85 - 1.18

Some discrepancies may result from the use of different equipment, techniques, and for some specific nuclides. These may be factored into the acceptance criteria and identified on the data sheet.