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

REGION III

Report Nos. 50-254/81-15; 50-265/81-15

Docket Nos. 50-254; 50-265 License Nos. 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: CECo Corporate Office (July 2, 1981)
Quad-Cities Site, Cordova, IL (July 6-10, 1981)

Inspectors: M. J. Oestmann 7/30/81

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Approved By: M. C. Schumacher, Acting Chief 7/30/81
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Preparedness and Program Support Branch

Inspection Summary

Inspection on July 6-10, 1981 (Report Nos. 50-254/81-15; 50-265/81-15)
Areas Inspected: Routine, announced inspection of the radiological environmental monitoring program including internal audit practices, and of the program for quality control of analytical measurements. The NRC Measurements Van was used onsite to make confirmatory measurements of samples collected and split with the licensee. The inspection involved 78 hours onsite by two NRC inspectors.
Results. No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

*J. Golden, Supervisor, Radioecology/Emergency Planning, Technical Services Nuclear Department (TSND), CECo
L. Literski, Meteorologist, TSND, CECo
*G. Abrell, Director, Quality Assurance for Operations, CECo
A. Saller, Engineer, Quality Assurance Department, CECo
**T. Tamlyn, Assistant Superintendent for Operations, QCNP, CECo
**L. Gerner, Assistant Plant Superintendent for Administration and Technical Services Support, QCNP
**R. Flessner, Supervisor, Technical Staff, QCNP
**T. Kovach, Supervisor, Radiation-Chemistry, QCNP
W. Walschot, Staff Assistant, Radiation Chemistry, QCNP
**G. Gary, Lead Chemist, Radiation-Chemistry, QCNP
**V. Smith, Chemist, Radiation Chemistry, QCNP
**J. Heilman, Engineer, Quality Assurance, QCNP

The inspectors also interviewed other licensee employees during the course of the inspection, including health physicists, and radiation chemistry technicians, members of the security force, and general office personnel.

*Denotes those present at the corporate interview on July 2, 1981.
**Denotes those present at the station exit interview on July 10, 1981.

2. Licensee Action on Previous Inspection Findings

a. (Closed) Noncompliance (50-254/78-04; 50-265/78-05): Exceeding 2° F per hour temperature limit while using plant diffusers. The licensee's corrective action was to request a Technical Specification change. The licensee received the T/S amendment from the Office of Nuclear Reactor Regulation in 1980. The inspector has no further questions regarding this item.

b. (Open) Open Item (50-254/80-31; 50-265/80-31): Loss of cooling canal lift pumps causing discharge in the canal to overflow and to washout a portion of an access road and undermining the site security fence on December 25, 1980. The licensee filled in the washout of soil and repaired the security fence in January 1981. On May 30, 1981, the discharge canal overflowed again due to operator error in inadvertently closing both diffuser pipe gates. There was minimal soil erosion and no damage to the security fence. During this inspection the inspector toured the area and found the security fence intact, and the access road and channel repaired. The licensee informed the U.S. Environmental Protection Agency and the State of Illinois about both overflows to the Mississippi River. The licensee stated that procedures would be revised to avoid recurrence of this event. This item will be examined in a future inspection.

3. General

This inspection consisted of a review of the 1980 radiological environmental monitoring program (REMP) and meteorological program, including implementation, sampling, equipment and location, program results, quality assurance and internal audits. The licensee's Appendix A Technical Specifications, Section 3.8/4.8F were used as the primary criteria for this inspection.

The licensee's program of quality control of analytical measurements and confirmatory measurements, including evaluation of the licensee's results of radiological effluent samples compared with those from the NRC's Measurements Van, were also reviewed.

4. Administrative and Procedural Controls

The inspectors reviewed the administrative and procedural controls for implementing the REMP program. Dr. J. Golden has prime responsibility for the conduct of the REMP and the meteorological monitoring program. Murray and Trettle, Inc., remains as the meteorological contractor but Hazelton Environmental Science Corporation became the new REMP contractor as of February 1, 1981. Eberline Instrument Corporation was the former contractor who performed the 1980 REMP.

No items of noncompliance or deviations were identified.

5. Licensee Audits

The licensee QA Department audit made in July 1980, of the REMP contractor (Eberline) and in June 1981, of the meteorological contractor (Murray and Trettle) were reviewed. Audit findings and observations of the REMP were followed up and closed out after the contractor's corrective actions were completed. The meteorological monitoring audit remains open until the contractor completes the corrective action to the two findings and one observation, due by September 1981. This item will be examined in a subsequent inspection.

The findings in the licensee's QA audit of the chemistry and radiochemistry program conducted in April 1980, were closed out in October 1980. The QA Department plans to conduct another audit of the chemistry and radiochemistry program in September 1981. This item will be examined in a future inspection.

No items of noncompliance or deviations were identified.

6. Implementation of the REMP

The inspector examined the licensee's REMP for CY 1980 for compliance with monitoring and reporting requirements in accordance with Sections 3.8/4.8 F of the Appendix A, Technical Specifications. This included examination of the Annual Report submitted by the licensee to the NRC, detailed monthly reports containing specific analytical data, weekly

sample collection data sheets and check sheets. Review of these documents indicated that all samples had been properly collected at the specified locations in accordance with T/S Table 4.8-1.

The analytical results indicated no unusual results or trends ascribable to plant operation, except for some samples from the blowdown diffuser pipe and Spray Canal blowdown. The licensee conducted the required supplementary gamma isotopic analysis on these samples. The activity was due primarily to Cs-134, Cs-137 and Co-60 attributable to station releases. The releases were less than 5% of the T/S release limits.

The effects of the fallout from the weapons testing by the People's Republic of China could be seen in air filters collected in December 1980. These effects were evident at other nuclear plant sites in December 1980. The inspector visited several air monitoring stations and found each station was in operation and properly maintained. The TLD's were also properly placed. Records showed that the stations had been calibrated and maintained in accordance with Technical Specification (Table 4.8-1) requirements. No problems were identified.

The inspector reviewed the quality control program of the licensee's contractor including the results from participation in the U.S. Environmental Protection Agency's cross check program. The contractor also participated in the U.S. Department of Energy Quality Assessment Program involving different types of environmental samples. No technical weaknesses were identified.

The licensee submitted a report on an environmental dose pathway study conducted from the spring, 1979, through the summer of 1980. The study involved measurements of exposures from noble gases, concentrations of I-131 in milk and radionuclides in fish. The study was performed in accordance with Appendix A, Technical Specifications, Section 4.8. No problems were identified.

No items of noncompliance or deviations were identified.

7. Meteorological Monitoring Program

The meteorological monitoring reports for CY 1980 prepared by the licensee's contractor were reviewed. The overall recovery rate of meteorological data was 95.6% which meets the guidance of Regulatory Guide 1.23. The inspector noted the contractor had maintained and calibrated the meteorological instrumentation on a bimonthly schedule. During a tour of the meteorological towers, the inspector found all equipment operable and in good condition. The meteorological data are presently recorded through the microtel system at the licensee's corporate center. The licensee will install readout equipment involving computers for dose calculations in the technical support center for emergency planning situations.

No items of noncompliance or deviations were identified.

8. Quality Assurance and Quality Control of Analytical Measurements on Reactor Water Systems

a. Nonradiological Analysis of Reactor Coolant

Selected licensee laboratory procedures for nonradiological effluent and chemical analysis of reactor coolant systems were reviewed to determine their adequacy and completeness. Procedures updated during CY 1980 and 1981 to date of this inspection included analyses for boron, sodium to phosphate ratio, chloride, silica, suspended and total dissolved solids, conductivity, turbidity, pH measurements, and sampling. The procedures had been reviewed by the lead chemist, plant management, and Onsite Review Committee.

The inspector toured the licensee's nonradiological chemistry laboratory and observed that all laboratory instruments appeared to be functional and operable, and the chemical solutions were currently dated. Calibrations of laboratory instruments are verified on a monthly schedule. Radiation-chemistry technicians were observed performing various analyses on samples collected.

Selected logs, checksheets and other records of analytical results were reviewed. The lead chemist conducts a daily review of the checksheets. Plant management is promptly informed during situations when unusual results or results exceeding limits are found. No problems were identified.

b. Radiological Analysis of Reactor Coolant and Liquid Effluents

Selected reactor coolant and radiological effluent procedures pertaining to radiochemical separations and analyses of radionuclides and counting room measurements, were also reviewed. In addition, the licensee has developed a central chemical procedures system for all its nuclear plants, called the Automated Analytical Instrumentation System. The procedures reviewed include radionuclide analysis for gas, particulate, iodine, liquid waste, crud, soluble gas, charcoal adsorber, and performance tests for multichannel analyzers, proportional counters, and detector efficiency calibrations. The Quad-Cities plant has been selected to test out these procedures with the use of computers and terminals. Results of analyses will be computerized to a centralized location.

Log sheets for the counting room and laboratory were also reviewed. Results of quality and functional checks of the licensee's alpha-beta counter and multichannel analyzers were examined. All checks required by procedures were conducted and recorded. A tour of the radiological chemistry laboratory and counting room revealed no major problem areas.

The inspectors observed the collection of offgas and liquid waste samples, and counting of the samples by the licensee. The licensee's analytical results from its own multichannel analyzer were compared with the NRC's results using the multichannel analyzer in the NRC Measurements Van as discussed in Paragraph 9. No technical problems in sample collection were noted.

c. Training of Chemistry Laboratory Personnel

Programs for training new chemistry laboratory personnel were discussed with licensee representatives. The licensee has developed a twelve week training program involving plant orientation, system description of plant operations, and laboratory analysis involving hands-on laboratory experience. Examinations are given during the training period. The licensee's initial training program for chemical laboratory practices appeared to be adequate.

d. Quality Control of Laboratory Performance

The inspectors examined the licensee's quality control practices for nonradiological and radiological measurements, including performance checks and calibrations of chemical and radiation counting equipment. The licensee conducts daily, weekly, and monthly checks on instruments in accordance with procedural requirements. The licensee is also developing a program to provide spikes or blind samples to technicians to perform specific analyses.

No items of noncompliance or deviations were identified.

9. Sample Comparisons for the Confirmatory Measurements Program

Results for comparative gamma analyses for effluent samples collected during this inspection and analyzed onsite by the Region III Measurements Van are shown in Table I. The comparison criteria used are given in Attachment 1. Analyses requiring counting for gross beta, tritium, strontium-89 and strontium-90 of a liquid waste sample will be completed by the licensee and included as an addendum to this report.

Eleven out of twelve comparisons met the criteria for agreement or possible agreement. A disagreement was identified for cesium-137 in the air particulate sample taken from the main chimney. The licensee's value was approximately twice that of the NRC, and therefore, conservative. Comparison of cesium-137 abundance and half-life values programmed into the two counting systems confirmed the licensee's abundance value was greater (89%) than that of the NRC (84%). The analysis disagreement was discussed with licensee representatives; however, no conclusive explanation for such a significant discrepancy was identified. A spiked particulate sample traceable within 3% to the National Bureau of Sciences was submitted to the licensee for analysis; these results will be included as an addendum to this report.

the comparison for krypton-88 initially gave only partial agreement. However, review of program parameters and consultation with pertinent references 1/ 2/ indicated the licensee used abundance of 26.3% to be correct rather than the NRC used value of 35%. Recalculation using the accepted value gave the agreement shown in Table 1.

Short lived radionuclides quantified by the Region III van in the liquid sample, specifically iodine-132 and strontium-91, were not submitted for comparison as the licensee's count of the liquid was started seven hours after that of the NRC. This delay would account for the radionuclide decay to less than the lower level of detection levels, 10% of the MPC values for unrestricted areas as specified in 10 CFR Part 20, Appendix B, Table II, Column 2, used for comparison criteria defined in IE Manual Chapter 84711B.

10. Exit Interview

The inspectors met with licensee representatives denoted in Paragraph 1 on July 2 in the licensee corporate headquarters and at the site on July 10, 1981, to discuss the scope and findings of the inspection. The licensee agreed to analyze the liquid split sample for gross beta, tritium, and strontium on July 28, 1981, and submit these results to the NRC; these comparisons will be included in an addendum to this report A copy will be furnished to the licensee.

Attachments:
1. Table 1, Confirmatory Measurement Program, Quad Cities, Third Quarter
2. Attachment 1, Criteria for Comparing Analytical Measurements

1/ D. C. Kocher, NUREG TM-102, "Nuclear Decay Data for Radionuclides Occurring in Routine Releases from Nuclear Fuel Cycle Facilities."

2/ Erdtman and Soyka, "The Gamma Rays of Radionuclides," Verlog Chemie, New York, New York, 1979.

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 Reference Laboratory'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. The acceptance category reported will be the narrowest into which the ratio fits for the resolution being used.

RESOLUTION	RATIO = LICENSEE VALUE/NRC REFERENCE VALUE		
	Agreement	Possible Agreement "A"	Possible Agreeable "B"
<3	No Comparison	No Comparison	No Comparison
≥3 and <4	0.4 - 2.5	0.3 - 3.0	No Comparison
≥4 and <8	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
≥8 and <16	0.6 - 1.67	0.5 - 2.0	0.4 - 2.5
≥16 and <51	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
≥51 and <200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.67
≥200	0.85 - 1.18	0.80 - 1.25	0.75 - 1.33

"A" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is greater than 250 keV.

Tritium analyses of liquid samples.

"B" criteria are applied to the following analyses:

Gamma spectrometry, where principal gamma energy used for identification is less than 250 keV.

Sr-89 and Sr-90 determinations.

Gross beta, where samples are counted on the same date using the same reference nuclide.

TABLE I

U S NUCLEAR REGULATORY COMMISSION

OFFICE OF INSPECTION AND ENFORCEMENT

CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: QUAD CITIES
FOR THE 3 QUARTER OF 1981

		------NRC-------		---LICENSEE-----		---NRC:LICENSEE----		
SAMPLE	ISOTOPE	RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
P FILTER	BA 140	5.6E-03	6.0E-05	4.5E-03	1.0E-03	8.0E-01	9.3E+01	A
	CS 137	3.9E-05	1.2E-06	8.5E-05	9.0E-06	2.2E- 0	3.3E+01	D
	CO 60	1.1E-04	2.5E-06	1.2E-04	5.0E-05	1.1E+00	4.4E+01	A
L WASTE	I 131	3.4E-06	4.8E-08	3.8E-06	6.0E-07	1.1E+00	7.1E+01	A
	I 133	2.5E-05	1.3E-05	2.6E-05	3.0E-06	1.0E+00	1.9E+00	N
	I 135	3.0E-05	6.2E-07	3.2E-05	4.0E-06	1.1E+00	4.8E+01	A
	BA 140	4.1E-06	1.5E-07	4.1E-06	1.0E-06	1.0E+00	2.7E+01	A
C FILTER	I 131	5.6E-02	1.0E-04	5.1E-02	1.0E-02	9.1E-01	5.6E+02	A
	I 133	1.8E-01	4.1E-04	1.5E-01	4.0E-02	8.3E-01	4.4E+02	P
	I 135	1.0E-01	7.3E-03	1.0E-01	7.0E-02	1.0E+00	1.4E+01	A
OFF GAS	XE 133	2.3E-03	1.5E-03	2.9E-03	1.0E-03	1.3E+00	1.5E+00	N
	KR 85M	1.4E-03	1.3E-05	1.5E-03	3.0E-04	1.1E+00	1.1E+02	A
	KR 87	1.8E-04	2.7E-05	1.6E-04	5.0E-05	8.9E-01	6.7E+00	A
	KR 88	2.2E-03	3.2E-05	2.1E-03	4.0E-04	9.5E-01	6.9E+01	A