

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/86011(DRSS); 50-455/86009(DRSS)

Docket Nos. 50-454; 50-455

Licenses No. NPF-37; CPPR-131

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

Facility Name: Byron Nuclear Generating Station, Units 1 and 2

Inspection At: Byron Site, Byron, IL

Inspection Conducted: March 17-21, 1986

Inspector: *M. Schumacher jr*
A. G. Januska

4/11/86
Date

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

4/11/86
Date

Inspection Summary

Inspection on March 17-21, 1986 (Reports No. 50-454/86011(DRSS);
50-456/86009(DRSS))

Areas Inspected: Routine announced inspection of; (1) the confirmatory measurements program including collection, analysis and comparison of results of samples split with the licensee and analyzed onsite using the Region III Mobile Laboratory, and (2) quality control of analytical measurements.

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

DETAILS

1. Persons Contacted

- *R. Querio, Station Manager
- *R. Ward, Services Superintendent
- *T. Joyce, Assistant Superintendent Technical Services
- *W. Berkamper, QA Supervisor (Operations)
- *S. Barrett, Acting Rad/Chem Supervisor
- *D. Robinson, Onsite Nuclear Safety
- *D. Herrmann, Station Chemist
- *K. Lurkins, Engineering Assistant Chemist
- *J. Langan, Compliance Staff
- *A. Britton, QA Inspector
- S. Halverson, Rad/Chem Technician

- *P. Brockman, NRC Resident Inspector

*Denotes those present at the exit interview.

2. Management Controls and Organization

The inspector reviewed the organization and staffing of the chemistry department. The department underwent a recent managerial change when a former Assistant Technical Staff Supervisor became Rad/Chem Supervisor effective March 24, 1986. The Station Chemist reports to this individual and is responsible for both chemistry and radiochemistry. Three Chemists, a Chemical Engineer, three Engineering Assistant Chemists and a Laboratory Foreman report to the Station Chemist and are each assigned specific areas of responsibility, for example, primary chemistry, secondary chemistry, counting room maintenance, calibration, etc. The Laboratory Foreman in addition to supervising Rad/Chem Technicians (RCTs) on the day shift is responsible for surveillance coordination. During all other shifts the Radiation Protection Foreman supervises RCTs assigned to the chemistry department. Of the nine individuals mentioned, five, including the Station Chemist are new in their positions (less than two years). The inspector reviewed the Station Chemist's education, training and experience and found that they satisfy the criteria specified in ANSI N18.1-1971, Selection and Training of Nuclear Power Plant Personnel.

No violations were identified.

3. Confirmatory Measurements

Five samples (air particulate filter, charcoal adsorber, release tank, reactor coolant, and gas) were analyzed for gamma emitters by the licensee and in the Region III mobile laboratory. In addition to analyzing these on the normal spectroscopy system, the licensee analyzed two samples (spiked charcoal adsorber and reactor coolant) on his Post Accident Radionuclide Analysis Portable System (PARAPS). All agreements were obtained in forty-eight comparisons. Table 1 lists the comparison results; Attachment 1 defines the comparison criteria used. In addition,

the licensee agreed to analyze a split of the release tank sample for gross beta, H-3, Sr-89, and Sr-90 and report the results to Region III (Open Item 50-454/86011-01; 50-455/86009-01).

Licensee spike particulate and spike adsorber standards were analyzed and the results used for comparison because no nuclides were present on an actual air particulate sample and only one peak (I-131) with a relatively high uncertainty was present on the charcoal adsorber.

In addition to reactor coolant comparisons, the inspector verified the accuracy of dose equivalent iodine calculations and examined the average beta and average gamma energies, and half lives used for EBAR determinations. Although the inspector noted a number of discrepancies between the licensee and NRC values, when NRC values were applied to the licensee's activity the final activity limit changed by less than one percent. The licensee agreed to review the above mentioned values listed in Appendix A3 of procedure BCP 230-3 (Open Item 50-454/86011-02; 50-455/86009-02).

No violations were identified.

4. Quality Control of Analytical Measurements

The inspector examined implementation of a QC program for counting room equipment. Counting room equipment is performance checked daily. If either the gamma spectrometers or gas proportional counters fail three times they are physically tagged out of service and left for the Engineering Assistant Chemist responsible for counting room maintenance to investigate. Test results are reviewed daily and trend plotted by the EA on a three month by the day graph. In addition, calibration curves for each spectrometer detector are plotted to verify consistency between geometries and from calibration to calibration, and Chi squared tests of proportional counters are performed. Recent calibration data from spectrometers (annual) and proportional counters (semiannual) were examined. Alpha efficiencies for the proportional counters appeared to the inspector to be lower than normal. As the known activity of a flat plate standard could not be accurately quantified, the licensee was asked to evaluate his alpha counting capabilities and document the results (Open Item 50-454/86011-03; 50-455/86009-03). Simulated air particulate samples with known activity were sent to the licensee to assist this evaluation. This item will be examined during a future inspection.

The licensee is involved in a gamma isotopic cross-check program with the Zion Nuclear Station. The results of the latest test, reactor coolant crud and low activity liquid, were examined. Crud result comparisons were generally good. Some disagreements in low activity liquid comparisons were identified. The inspector discussed techniques for reducing sample variability. The licensee does not participate in any other intercomparison programs involving radioactive samples.

No problems were noted during observations made of general working habits of radiochemistry laboratory and counting room personnel during the collection, splitting and counting of samples. Instrumentation in the radiochemical lab was found to be in calibration.

No violations were identified.

5. Audits

The inspector reviewed audits 06-86-02, 06-85-63, 06-85-16, and 06-85-04. No significant findings related to radiochemistry or the counting room were noted but one audit did state concern with procedures, procedure compliance, and analytical technique attributable to RCT proficiency affected by the fact that only 20% of RCT time is spent in chemistry.

No violations were identified.

6. 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 Sections 3 and 4.

7. Exit Interview

The inspector reviewed the scope and findings of the inspection with licensee representatives on March 21, 1986. Discrepancies noted in EBAR calculation inputs and alpha efficiencies on the proportional counters were discussed in detail. The licensee acknowledged the inspector's comments.

During the inspection, the inspector 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 procedures as proprietary.

Attachments:

1. Table 1, Confirmatory Measurements
Program Results, 1st Quarter 1986
2. Attachment 1, Criteria for Comparing
Analytical Measurements

TABLE 1

U S NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: BYRON
FOR THE 1 QUARTER OF 1986

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
C FILTER	1-131	9.8E-13	2.0E-13	9.9E-13	0.0E-01	1.0E 00	4.9E 00	A
L WASTE	MN-54	1.4E-06	1.5E-07	1.5E-06	0.0E-01	1.1E 00	9.4E 00	A
	CO-58	1.1E-05	2.6E-07	9.7E-06	0.0E-01	8.8E-01	4.2E 01	A
	CO-60	3.1E-06	1.7E-07	2.5E-06	0.0E-01	8.1E-01	1.8E 01	A
	CS-137	8.8E-07	1.9E-07	4.7E-07	0.0E-01	5.3E-01	4.8E 00	A
C SPIKED	CO-57	1.7E-02	2.2E-04	1.6E-02	0.0E-01	9.3E-01	7.9E 01	A
	CO-60	5.7E-02	7.6E-04	5.7E-02	0.0E-01	1.0E 00	7.5E 01	A
	HG-203	8.9E-03	2.8E-04	1.1E-02	0.0E-01	1.2E 00	3.2E 01	A
	Y-88	4.2E-02	7.1E-04	4.5E-02	0.0E-01	1.1E 00	5.9E 01	A
	SN-133	3.4E-02	5.0E-04	3.9E-02	0.0E-01	1.1E 00	6.8E 01	A
	CS-137	6.0E-02	7.0E-04	6.3E-02	0.0E-01	1.1E 00	8.5E 01	A
	CE-139	2.2E-02	2.5E-04	2.5E-02	0.0E-01	1.2E 00	8.8E 01	A
F SPIKED	CO-57	1.7E-02	1.5E-04	1.7E-02	0.0E-01	1.0E 00	1.1E 02	A
	CO-60	5.8E-02	5.7E-04	6.0E-02	0.0E-01	1.0E 00	1.0E 02	A
	HG-203	8.8E-03	1.9E-04	1.0E-02	0.0E-01	1.2E 00	4.6E 01	A
	Y-88	4.3E-02	5.7E-04	4.6E-02	0.0E-01	1.1E 00	7.5E 01	A
	SN-133	3.5E-02	4.1E-04	4.0E-02	0.0E-01	1.1E 00	8.6E 01	A
	CS-137	6.4E-02	5.7E-04	6.5E-02	0.0E-01	1.0E 00	1.1E 02	A
	CE-139	2.1E-02	1.8E-04	2.5E-02	0.0E-01	1.2E 00	1.2E 02	A
PRIMARY	NA-24	4.2E-03	1.1E-04	4.4E-03	0.0E-01	1.0E 00	3.8E 01	A
PA&APS	CO-58	4.8E-04	7.0E-05	2.8E-04	0.0E-01	5.9E-01	6.8E 00	A
	I-131	6.8E-03	1.6E-04	7.7E-03	0.0E-01	1.1E 00	4.2E 01	A
	I-132	2.8E-02	2.5E-04	3.0E-02	0.0E-01	1.1E 00	1.1E 02	A
	I-133	2.6E-02	1.7E-04	2.8E-02	0.0E-01	1.1E 00	1.5E 02	A
	I-134	4.7E-02	7.5E-04	4.2E-02	0.0E-01	9.0E-01	6.2E 01	A
	I-135	3.6E-02	6.2E-04	3.7E-02	0.0E-01	1.0E 00	5.9E 01	A
	CS-137	7.3E-04	8.5E-05	7.4E-04	0.0E-01	1.0E 00	8.5E 00	A
	CS-138	5.9E-02	2.0E-03	4.6E-02	0.0E-01	7.8E-01	3.0E 01	A

T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

*=CRITERIA RELAXED

N=NO COMPARISON

TABLE 1

U S NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: BYRON
FOR THE 1 QUARTER OF 1986

SAMPLE	ISOTOPE	-----NRC-----		----LICENSEE----		---LICENSEE:NRC---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
OFF GAS	KR-85	9.1E-04	1.4E-04	8.4E-04	0.0E-01	9.2E-01	6.6E 00	A
	XE-131M	6.1E-04	2.6E-05	5.0E-04	0.0E-01	8.2E-01	2.3E 01	A
	XE-133	7.8E-03	1.9E-04	7.1E-03	0.0E-01	9.1E-01	4.2E 01	A
	XE-133M	2.4E-05	3.5E-06	2.1E-05	0.0E-01	8.7E-01	6.9E 00	A
C SPIKED PARAPS	CO-57	1.7E-02	2.2E-04	1.5E-02	0.0E-01	8.4E-01	7.9E 01	A
	CO-60	5.7E-02	7.6E-04	5.4E-02	0.0E-01	9.4E-01	7.5E 01	A
	HG-203	8.9E-03	2.8E-04	1.0E-02	0.0E-01	1.2E 00	3.2E 01	A
	Y-88	4.2E-02	7.1E-04	4.2E-02	0.0E-01	1.0E 00	5.9E 01	A
	SN-113	3.4E-02	5.0E-04	3.7E-02	0.0E-01	1.1E 00	6.8E 01	A
	CS-137	6.0E-02	7.0E-04	5.8E-02	0.0E-01	9.8E-01	8.5E 01	A
	CE-139	2.2E-02	2.5E-04	2.3E-02	0.0E-01	1.0E 00	8.8E 01	A
PRIMARY	NA-24	4.2E-03	1.1E-04	4.3E-03	0.0E-01	1.0E 00	3.8E 01	A
	CO-58	4.8E-04	7.0E-05	3.7E-04	0.0E-01	7.8E-01	6.8E 00	A
	I-131	6.8E-03	1.6E-04	7.3E-03	0.0E-01	1.1E 00	4.2E 01	A
	I-132	2.8E-02	2.5E-04	3.0E-02	0.0E-01	1.1E 00	1.1E 02	A
	I-133	2.6E-02	1.7E-04	2.7E-02	0.0E-01	1.0E 00	1.5E 02	A
	I-134	4.7E-02	7.5E-04	5.4E-02	0.0E-01	1.2E 00	6.2E 01	A
	I-135	3.6E-02	6.2E-04	3.9E-02	0.0E-01	1.1E 00	5.9E 01	A
	CS-137	7.3E-04	8.5E-05	4.7E-04	0.0E-01	6.5E-01	8.5E 00	A
	CS-138	5.9E-02	2.0E-03	5.4E-02	0.0E-01	9.2E-01	3.0E 01	A

T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

*=CRITERIA RELAXED

N=NO COMPARISON

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>≥3</u> and <4	0.4 - 2.5
<u>≥4</u> and <8	0.5 - 2.0
<u>≥8</u> and <16	0.6 - 1.67
<u>≥16</u> and <51	0.75 - 1.33
<u>≥51</u> and <200	0.80 - 1.25
<u>≥200</u>	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.