

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-295/90027(DRSS); 50-304/90029(DRSS)

Docket Nos. 50-295; 50-304

License Nos. DRP-39; DRP-48

Licensee: Commonwealth Edison Company
Opus West III
1400 Opus Place
Downers Grove, IL 60515

Facility Name: Zion Generating Station, Units 1 and 2

Inspection At: Zion Site, Zion, IL 60099

Inspection Conducted: October 22-26, 1990 (On-site)

Inspector: *R. B. Holtzman*
R. B. Holtzman

11/6/90
Date

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

11/4/90
Date

Inspection Summary

Inspection on October 22-26, 1990 (Report Nos. 50-295/90027(DRSS);
50-304/90029(DRSS))

Areas Inspected: Routine unannounced inspection of the radiochemistry program including: (1) review of open items (IP 84750); (2) implementation of the counting room quality assurance/quality control programs (IP 84750); (3) comparison of measurements of split radiological samples with the Mobile Laboratory (IP 84750); (4) review of the Radiological Environmental Monitoring Program (REMP)(IP 84750); and (5) licensee audits (IP 84750).

Results: Laboratory quality assurance was generally good. Results of the radiological confirmatory measurement program were good, as were the licensee's interlaboratory crosscheck results with a vendor laboratory. The REMP reports were satisfactory, but the air sampling stations had some deficiencies, which the licensee will correct. No violations or deviations were identified.

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DETAILS

1. Persons Contacted

- T. P. Joyce, Station Manager, Zion, CECO
- ¹T. Rieck, Technical Superintendent, Zion
- ¹D. P. Hemmerle, Lead Chemist, Zion
- ¹G. W. Beale, Station Chemist, CECO
- ¹L. L. Lanes, Emergency Preparedness Coordinator, Zion
- P. Gilman, Chemist, Zion
- T. Saksefski, Regulatory Assurance, Zion

- ¹R. J. Leemon, Resident Inspector, NRC

The inspector also interviewed other licensee personnel in various departments in the course of the inspection.

¹ Denotes those present at the plant exit interview on October 26, 1990.

2. Licensee Action on Previous Inspection Findings

(Closed) Open Item Nos. (295/89024-01; 304/89022-01): Licensee analyzed a split sample for gross alpha, gross beta, H-3, Fe-55, Sr-89 and Sr-90 and submitted the results to Region III for comparison with those from the NRC Reference Laboratory, the Radiological Environmental Sciences Laboratory (RESL) in Idaho. The comparisons of the results are presented in Table 1 with the comparison criteria in Attachment 1. In six comparisons, the licensee had two agreements and one disagreement; three results were not compared due to very low activities, below required LLDs, in the sample. A second value on the Fe-55 reported by a different laboratory resulted in an agreement. Since another sample was taken during this inspection (Section 4), this item is considered closed.

3. Management Controls, Organization and Training (IP 84750)

The organization and staffing of the chemistry group were unchanged since the previous inspection in this area.¹ The Radiochemist is an experienced chemist. Although he has been in the radiochemistry area for only about a year, he is very knowledgeable in this area.

The chemistry offices were returned to a refurbished and expanded area near the laboratories.²

The personnel and organization appear to be adequate to perform the required laboratory activities.

No violations or deviations were identified.

- ¹. Region III Inspection Report Nos. (50-295/90016; 50-304/90018)
- ². Ibid.

4. Confirmatory Measurements (IP 84750)

a. Radiological Split Sample

The licensee split a liquid radwaste sample with the NRC to be analyzed for gross beta, gross alpha, H-3, Fe-55, Sr-89 and Sr-90 by the licensee and the results reported to Region III for comparison with those of the RESL. In addition the NRC will submit a spiked sample to the licensee for analysis. These analyses will be followed under Open Item Nos. (295/90027-01; 304/90029-01).

b. Confirmatory Measurements Results

A reactor coolant filtrate (liquid) sample and its filter (crud filter), liquid radwaste and gas decay tank samples, and a containment charcoal cartridge and its associated air particulate filter were analyzed for gamma emitting isotopes by the licensee on several detectors, and in the Region III Mobile Laboratory on site. Comparisons of the results are presented in Table 2 with the comparison criteria in Attachment 1. The licensee achieved 85 agreements in 89 comparisons. Achievement of agreements with the results for the shorter-lived iodine isotopes (I-133 and I-135) and Br-82 required corrections for radioactive decay during the sample collection period made by the AAIS software, and also for the collection efficiency of the latter nuclide by the charcoal cartridge. The disagreement of the Xe-133 results was not resolved; it appears to be due to variations in thickness of the glass in the licensee's collector bulbs, a particularly significant effect because of this nuclide's the low energy (81 keV) gamma-ray. This uncertainty in calibration is supported by the results in the licensee's interlaboratory comparisons (Section 5) of gas samples which demonstrated high variability relative to those of other nuclides. A disagreement also occurred for Mn-54 in the crud filter on one counter, but was in agreement on the other counter. The differences appeared to be due to poor counting statistics. The other disagreements of Ba-139 and Mo-99 in the crud filter were not resolved, but each was picked up on one of the licensee's two detectors. The differences again appeared to be due to poor counting statistics and, for the Ba-139, to its short half life. Results from several of the licensee's detectors were used and showed good reproducibilities. While the licensee did not observe several of the nuclides on some counts, they did pick them up on subsequent recounts done according to standard laboratory counting procedures.

Overall, the results of the comparisons were good.

No violations or deviations were identified.

5. Quality Assurance/Quality Control (QA/QC)(IP 84750)

The inspector reviewed the laboratory radioactivity measurements QA/QC program, including physical facilities and laboratory operations. Housekeeping was generally good. The laboratory presently has four operational Ge detector gamma-ray spectrometry systems in the counting room operated on the corporate AAIS and another emergency PARAP System using a separate vendor-supplied multichannel analyzer. The detector efficiency curves are standardized annually and checked for consistency by treating the new standards as unknown samples. Both the chemistry/radiochemistry laboratory and the counting room were large and adequate for the the required operations. A Chemistry Technician (CT) observed during sample acquisition and preparation demonstrated good laboratory technique.

The inspector reviewed selected records from the past year pertaining to the radiochemistry control program. The laboratory has a good practice in which the corporate AAIS counting system automatically locks out the system for sample counting when the performance check source is outside the ± 2 sigma range (based on counting statistics). The instrument control charts, based on results from a Co-60 and Ba-133 check source, had ± 2 standard deviation (SD) control limits. These limits were derived from Chi-squared calculations made from 20 measurements done at the start of the year, or as needed during the year. These sources were counted daily and the results plotted on the control charts. Peak widths (Full width at half maximum, FWHM) and background values were also plotted. The inspector noted that for some of the detectors, the control limits were somewhat greater than warranted by the data; it appears that control parameters would better reflect instrumental performance if determined more frequently, from recent check source data, rather than from a few short-term data points taken in the past. Licensee representatives noted that the control charts were made from the check source data stored in an AAIS file that was difficult to edit. They agreed to use recent data and do more frequent calculations when the the new vendor-supplied gamma analysis and data management system is installed, scheduled to start in November 1990.

The radiological interlaboratory comparison program results with a vendor (Analytics, Inc.) for the last four quarters were very good with only a few disagreements for H-3 analyses due to the chemist's misunderstanding of the vendor's instructions. There appeared to be essentially no bias with respect to the vendor's results.

Overall, the QA/QC program appears to be operating satisfactorily.

No violations or deviations were identified

6. Radiological Environmental Monitoring Program (REMP) (IP 84750)

While the REMP is operated from the Corporate Office, the Plant GSEP Coordinator is essentially the local representative. He is knowledgeable about the program and the sampling and TLD locations. Until recently he was an instructor training technicians in this program.

The inspector reviewed the REMP, including the 1989 Annual Environmental Report and the final 1989 monthly environmental report which contains the individual measurements for 1989, and the cumulative 1990 data contained in the most recently available monthly report (January-August 1990). Taken together, these reports appeared to comply with the Technical Specification requirements for the REMP. All of the required samples were collected and analyzed, except as noted in the report, and a perusal of the results showed them to be reasonable. The measurements appeared to be acceptable.

The inspector examined the environmental air sampling stations around the plant and checked the systems for operability and leakage. The pumps and filter trains on the five air samplers observed had good vacuum and flowrates. The inspector reviewed the calibration records kept in the HP office. The inspector stated concerns to licensee representatives that the intake and exhaust ports of the samplers were in close proximity to the intake filters, which could allow the recirculation of exhaust air into these filters. The licensee stated that the procedure would be modified to insure that the pumps would be placed with the intake filter close to the intake vent of the protective housing and that the exhaust would be conducted through a tube to another housing vent where it would be fixed in place. This will be followed in subsequent routine inspections under Open Item Nos. (295/90027-02); 304/90029-02).

Except for the above concern, the REMP appeared to be satisfactory.

No violations or deviations were identified.

7. Audits and Appraisals (IP 84750)

The inspector reviewed a detailed corporate Chemistry Assessment of Zion Chemistry, February 5-9, 1990 by a team of experienced chemists and radwaste personnel. They found five Category I improvement items. One item included several subcategories of problems of which several related to the counting room and radwaste. The responses were timely, but because much effort would be required on these, the items were not all resolved. The resolutions will be followed in subsequent routine inspections in these areas.

No violations or deviations were identified.

8. 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. Two open items were disclosed during the inspection in Section 4 and 6.

9. Exit Interview

The scope and findings of the inspection were reviewed with licensee representatives (Section 1) at the conclusion of the inspection on October 26, 1990. The inspector discussed the confirmatory measurements

results, and the modifications suggested for the QC charts on the radiochemistry counting systems. Licensee representatives agreed to modify the calculations on the control charts discussed in Section 5. The REMP discussed in Section 7 was generally satisfactory, except for some deficiencies noted in the air sampling stations. Licensee representatives agreed to correct these deficiencies.

During the exit interview, 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 processes as proprietary.

Attachments:

1. Table 1, Radiological Interlaboratory Split Sample Results,
3rd Quarter 1989
2. Table 2, Radiological Interlaboratory Comparison Results,
4th Quarter 1990
3. Attachment 1, Criteria for Comparing Radiological Measurements

Radiological Confirmatory Measurements

TABLE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION III

FACILITY: ZION

4th QUARTER 1990

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SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
CHARCOAL	BR-82	2.71E-11	1.21E-12	2.80E-11	0.00E+00	1.03	22.4	A
CART.	I-131	4.10E-10	2.76E-12	4.03E-10	0.00E+00	0.98	148.6	A
DETECTOR	I-133	1.78E-10	2.56E-12	1.80E-10	0.00E+00	1.01	69.5	A
29 TP	I-135	4.06E-11	5.84E-12	3.80E-11	0.00E+00	0.94	7.0	A
CHARCOAL	BR-82	2.71E-11	1.21E-12	2.80E-11	0.00E+00	1.03	22.4	A
CART.	I-131	4.10E-10	2.76E-12	4.28E-10	0.00E+00	1.04	148.6	A
DETECTOR	I-133	1.78E-10	2.56E-12	1.80E-10	0.00E+00	1.01	69.5	A
48RB	I-135	4.06E-11	5.84E-12	3.50E-11	0.00E+00	0.86	7.0	A
AIR PART.	CS-134	8.82E-13	2.05E-13	1.00E-12	2.10E-13	1.13	4.3	A
DETECTOR	CS-137	1.96E-12	2.34E-13	1.70E-12	2.60E-13	0.87	8.4	A
48RB	I-131	7.32E-13	1.58E-13	1.00E-12	1.90E-13	1.37	4.6	A
	I-133	2.05E-12	2.77E-13	3.20E-12	4.00E-13	1.56	7.4	A
AIR PART.	CS-134	8.82E-13	2.05E-13	1.20E-12	1.60E-13	1.36	4.3	A
DETECTOR	CS-137	1.96E-12	2.34E-13	2.50E-12	2.50E-13	1.28	8.4	A
29 TP	I-131	7.32E-13	1.58E-13	5.60E-13	1.11E-13	0.77	4.6	A
	I-133	2.05E-12	2.77E-13	2.90E-12	3.10E-13	1.41	7.4	A
LIQUID	MN-54	1.25E-06	1.30E-07	1.30E-06	1.50E-07	1.04	9.6	A
RADWASTE	CO-58	9.69E-06	2.24E-07	9.50E-06	8.20E-07	0.98	43.3	A
DETECTOR	CO-60	6.85E-06	2.17E-07	7.30E-06	4.70E-07	1.07	31.6	A
23 QB	AG-110M	1.93E-06	1.47E-07	1.70E-06	3.20E-07	0.88	13.1	A
	SB-125	7.26E-06	4.83E-07	6.60E-06	7.10E-07	0.91	15.0	A
	CS-134	1.87E-05	2.51E-07	1.90E-05	1.00E-06	1.02	74.5	A
	CS-137	2.69E-05	3.13E-07	2.70E-05	2.30E-06	1.00	85.9	A
	LA-140	4.08E-07	6.56E-08	3.20E-07	6.0E-08	0.78	6.2	A
	I-131	3.45E-06	1.73E-07	4.00E-06	3.30E-07	1.16	19.9	A
	I-133	5.37E-06	1.98E-07	5.10E-06	4.90E-07	0.95	27.1	A
LIQUID	MN-54	1.25E-06	1.30E-07	1.46E-06	1.50E-07	1.17	9.6	A
RADWASTE	CO-58	9.69E-06	2.24E-07	9.40E-06	7.70E-07	0.97	43.3	A
DETECTOR	CO-60	6.85E-06	2.17E-07	6.90E-06	4.20E-07	1.01	31.6	A
48RB	AG-110M	1.93E-06	1.47E-07	2.10E-06	3.20E-07	1.09	13.1	A
	SB-125	7.26E-06	4.83E-07	8.40E-06	8.00E-07	1.16	15.0	A
	CS-134	1.87E-05	2.51E-07	1.90E-05	8.00E-07	1.02	74.5	A
	CS-137	2.69E-05	3.13E-07	2.70E-05	2.10E-06	1.00	85.9	A
	LA-140	4.08E-07	6.56E-08	3.50E-07	5.80E-08	0.86	6.2	A
	I-131	3.45E-06	1.73E-07	3.80E-06	3.10E-07	1.10	19.9	A
	I-133	5.37E-06	1.98E-07	5.10E-06	4.50E-07	0.95	27.1	A

Radiological Confirmatory Measurements

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
OFF GAS	KR-85	4.98E-04	2.26E-04	3.30E-04	4.80E-05	0.66	2.2	A
GDT 2A	XE-131M	5.16E-05	1.50E-05	7.40E-05	8.80E-06	1.43	3.4	A
DET.31SC	XE-133	7.34E-04	7.12E-06	9.40E-04	8.10E-05	1.28	103.1	D
PRIMARY	NA-24	3.27E-03	1.43E-04	2.90E-03	2.80E-04	0.89	22.9	A
COOLANT	CS-134	4.26E-04	5.94E-05	4.20E-04	9.30E-05	0.99	7.2	A
DETECTOR	CS-137	6.36E-04	9.09E-05	6.00E-04	1.12E-04	0.94	7.0	A
29TP	CS-138	3.90E-02	4.73E-03	2.40E-02	5.60E-03	0.61	8.3	A
	MO-99	3.09E-04	7.26E-05	3.60E-04	5.70E-04	1.17	4.3	A
	I-131	1.44E-03	1.32E-04	9.80E-04	1.26E-04	0.68	10.9	A
	I-132	1.31E-02	2.51E-04	1.10E-02	6.00E-04	0.84	52.2	A
	I-133	8.35E-03	1.26E-04	7.70E-03	6.40E-04	0.92	66.3	A
	I-134	2.11E-02	1.13E-03	1.80E-02	1.90E-03	0.85	18.7	A
	I-135	1.49E-02	5.76E-04	1.30E-02	7.00E-04	0.87	25.9	A
PRIMARY	NA-24	3.27E-03	1.43E-04	3.00E-03	3.20E-04	0.92	22.9	A
COOLANT	MO-99	3.09E-04	7.26E-05	3.60E-04	5.70E-04	1.17	4.3	A
DETECTOR	CS-134	4.26E-04	5.94E-05	5.40E-04	1.20E-04	1.27	7.2	A
48RE	CS-137	6.36E-04	9.09E-05	4.60E-04	1.08E-04	0.72	7.0	A
	CS-138	3.93E-02	4.73E-03	2.70E-02	0.00E+00	0.69	8.3	A
	I-131	1.44E-03	1.32E-04	1.10E-03	1.50E-04	0.76	10.9	A
	I-132	1.31E-02	2.51E-04	1.10E-02	6.00E-04	0.84	52.2	A
	I-133	8.35E-03	1.26E-04	7.30E-03	6.10E-04	0.87	66.3	A
	I-134	2.11E-02	1.13E-03	1.90E-02	2.50E-03	0.90	18.7	A
	I-135	1.49E-02	5.76E-04	1.20E-02	8.00E-04	0.81	25.9	A
CRUD	NA-24	8.84E-07	9.19E-08	1.10E-06	1.10E-07	1.24	9.6	A
FILTER	CR-51	5.05E-06	4.61E-07	5.30E-06	5.40E-07	1.05	11.0	A
RCS	MN-54	1.58E-07	3.55E-08	4.30E-08	0.00E+00	0.27	4.5	D
DETECTOR	ZR-97	1.43E-06	8.84E-08	1.40E-06	1.20E-07	0.98	16.2	A
29 TP	CO-58	9.88E-06	1.67E-07	1.20E-05	1.10E-05	1.21	59.2	A
	CO-60	8.76E-07	6.69E-08	8.20E-07	5.90E-08	0.94	13.1	A
	AS-76	5.49E-07	1.58E-07	4.20E-07	1.01E-07	0.76	3.5	A
	ZR-95	1.35E-06	1.12E-07	1.50E-06	1.40E-07	1.11	12.1	A
	NB-95	1.37E-06	6.42E-08	1.50E-06	0.00E+00	1.09	21.3	A
	MO-99	1.20E-07	1.36E-08	8.70E-08	0.00E+00	0.73	7.2	A
	CS-134	3.47E-07	9.45E-08	2.70E-07	4.30E-08	0.78	3.7	A
	CS-137	3.57E-07	5.62E-08	3.10E-07	4.30E-08	0.87	6.4	A
	BA-139	6.23E-05	1.21E-05	3.00E-05	2.40E-06	0.48	5.1	D
	I-131	1.51E-07	4.29E-08	1.50E-07	3.70E-08	0.99	3.5	A
	I-133	9.73E-07	9.52E-08	9.20E-07	9.20E-08	0.95	10.2	A

Radiological Confirmatory Measurements

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
CRUD	NA-24	8.84E-07	9.19E-08	1.20E-06	1.20E-07	1.36	9.6	A
FILTER	CR-51	5.05E-06	4.61E-07	6.30E-06	7.40E-07	1.25	11.0	A
RCS	MN-54	1.58E-07	3.55E-08	1.70E-07	0.00E+00	1.08	4.5	A
DETECTOR	ZR-97	1.43E-06	8.84E-08	1.60E-06	1.50E-07	1.12	16.2	A
48RB	CO-58	9.88E-06	1.67E-07	1.20E-05	0.00E+00	1.21	59.2	A
	CC-80	8.76E-07	6.69E-08	7.90E-07	6.90E-08	0.90	13.1	A
	AS-76	5.49E-07	1.58E-07	5.00E-07	1.63E-07	0.91	3.5	A
	ZR-95	1.35E-06	1.12E-07	1.70E-06	1.70E-07	1.26	12.1	A
	NB-95	1.37E-06	6.42E-08	1.50E-06	0.00E+00	1.09	21.3	A
	MO-99	1.20E-07	1.66E-08	0.00E+00	0.00E+00		7.2	D
	CS-134	3.47E-07	9.45E-08	2.50E-07	5.50E-08	0.72	3.7	A
	CS-137	3.57E-07	5.62E-08	3.50E-07	5.20E-08	0.98	6.4	A
	BA-139	6.23E-05	1.23E-05	3.40E-05	2.90E-06	0.55	5.1	A
	I-131	1.51E-07	4.29E-08	1.40E-07	4.30E-08	0.93	3.5	A
	I-133	9.73E-07	9.52E-08	1.00E-06	1.20E-07	1.03	10.2	A

TEST RESULTS:

A=AGREEMENT
 D=DISAGREEMENT
 *=CRITERIA RELAXED
 N=NO COMPARISON

Total= 89
 Disag= 4

TABLE 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION III

CONFIRMATORY MEASUREMENTS PROGRAM

SPLIT SAMPLE

FACILITY: Zion

3rd QUARTER 1969

SAMPLE	NUCLIDE	NRC VAL.	NRC ERR.	LIC.VAL.	LIC.ERR.	RATIO	RESOL.	RESULT
RADWASTE	H-3	3.82E-02	4.00E-04	3.90E-02	3.70E-03	1.02	95.5	A
SPLIT	FE-55	3.05E-06	7.00E-08	6.66E-06	6.70E-07	2.18	43.6	D
	SR-89	-1.30E-09	6.30E-09	<4E-9			-0.2	N
	SR-90	-3.00E-09	3.00E-09	<8E-10			-1.0	N
	Gross A	0.00E+00	3.00E-09	<7.9E-9			0.0	N
	Gross B	2.47E-06	1.10E-07	2.10E-06		0.85	22.5	A
2nd Lab:	FE-55	3.05E-06	7.00E-08	2.66E-06	2.66E-07	0.87	43.6	A

TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

*=CRITERIA RELAXED

N=NO COMPARISON