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

REGION III

Report No. 50-295/81-24; 50-304/81-20

Docket No. 50-295; 50-304 License No. DPR-39; DPR-48

Licensee: Commonwealth Edison Company
P. O. Box 767
Chicago, IL 60690

Facility Name: Zion Nuclear Power Station, Units 1 and 2

Inspection At: Zion Site, Zion, IL

Inspection Conducted: September 28 through October 2, 1981

S. Rozak

Inspectors: S. Rozak 10/13/81
Radiation Specialist

S. Rozak for NAN

N. A. Nicholson 10/13/81
Radiation Specialist

M. Schumacher

Approved By: M. C. Schumacher, Chief, 10/15/81
Independent Measurements and
Environmental Protection Section

Inspection Summary:

Inspection on September 28 through October 2, 1981 (Report No. 50-295/81-24; 50-304/81-20)
Areas Inspected: Routine unannounced inspection of the confirmatory measurements program. Included collection and analysis of radiological effluents onsite by the Region III Mobile Laboratory. The inspection involved 60 inspector-hours on site by two NRC inspectors.
Results: No apparent items of noncompliance were identified.

DETAILS

1. Persons Contacted

*K. Graesser, Station Superintendent
*G. Pliml, Assistant Station Superintendent
*D. Howard, Rad Chemistry Supervisor
*B. Schramer, Lead Chemist
*P. Zwilling, Radchemist
M. Andrews, Radchemist
J. Jirka, Radchemist
*B. Harl, Quality Assurance Inspector
*P. Kuhner, Quality Assurance Inspector
*D. Flynn, Quality Assurance Inspector

*Attended exit meeting October 2, 1981.

2. (Closed) Unresolved Item (50-295/80-22-02; 50-304/80-24-02)

Two charcoal samples compared during the previous inspection were forwarded to RESL as an independent check of quantified results. The licensee's results were in agreement with those of RESL; therefore, this item is closed.

(Closed) Violation (50-295/80-22-01; 50-304/80-24-01). Failure to accurately quantify Xe-133 in containment air sample.

The inspectors verified the licensee's corrective action. Current gas calibration procedures appeared appropriate for the types of gas samples counted. Comparisons during this inspection showed agreement.

No items of noncompliance were identified.

3. Sample Comparison Results in the Confirmatory Measurements Program

(a) Results of Sample Splits

The inspection consisted of comparing analytical results of the licensee's effluents to insure he is capable of accurately quantifying releases in order to comply with regulatory limits. Liquid, gas, particulate and charcoal samples were analyzed by the licensee and by the NRC Region III Mobile Laboratory. In addition an NBS traceable spiked charcoal cartridge was analyzed by the licensee at the request of the inspectors. The results of the comparative gamma analysis are shown in Table I, and the comparison criteria in Attachment I. Analysis requiring beta counting (tritium, strontium, and gross beta) will be completed by the licensee and reported later. Fifteen of eighteen onsite comparisons met the established criteria for agreement or possible agreement. The three disagreements were all on charcoal adsorbers and were all conservative.

No problems were identified in the case of the liquid, gas and particulate media. The licensee's ability to quantify activity in these media has improved since the previous inspection of November 17-19, 1980. The inspectors believe this is due partly to the licensee's calibrating his geometries at more frequent intervals and partly to a change in the procedures for calibration of gas and particulates.

Comparisons were made on two containment charcoal cartridges and on an NBS traceable spiked charcoal cartridge. For all comparisons in this medium the licensee's values were higher than the NRC values by factors ranging from 1.4 to 1.7. The licensee has changed his procedure for calibrating this geometry since the previous inspection in an effort to correct problems identified at that time. After reviewing procedure ZCP407 (calibration of Ge(Li) detectors) and discussion with the licensee technicians, the inspectors suspect that a likely source of the current disagreements is the licensee's preparation of the face-loaded charcoal standard used to calibrate this geometry. Other possible sources of disagreement are differences in radionuclide distribution between standards and collected samples and counting techniques that do not compensate for these differences. The need for accurately quantifying iodine was discussed with the licensee and he agreed to review source preparation and counting techniques in an effort to resolve these disagreements.

(b) Procedure Review

The inspectors verified that Sr-92 and Cs-136 have been added to the licensee's nuclide libraries. A review of calibration logs and procedures verified that the calibration procedures have been modified since the previous inspection and that all geometries have been recalibrated since the last inspection on an approximately semiannual schedule. The licensee no longer automatically rejects analysis results in which the 2σ error is greater than 25 percent. This error criterion has been changed to a 100 percent level. The licensee has added a duplicate computer system as a backup in case of problems with his primary system. Lastly, the licensee now participates in an EPA cross check program. Most of these changes address concerns expressed by the NRC inspectors during the previous inspection in 1980.

4. Exit Interview

The inspectors met with licensee representatives indicated in paragraph 1 at the conclusion of the inspection on October 2, 1981. The scope of the inspection and charcoal adsorber calibration procedures were discussed. At that time, the licensee made the following committments:

(a) Analyse and report the results of counting an NBS traceable spiked charcoal adsorber following evaluation of currently used calibration and counting procedures (ZCP407) (Open item 295/81-24-01, 304/81-20-01) and

(b) Analyse the liquid sample collected during the inspection for tritium, strontium, and gross beta and report to Region III the results corrected to 12:00 p.m. CDT October 23, 1981. (Open item 295/81-24-02; 304/81-20-02.

Attachments:
1. Criteria for Comparing Analytical Measurements
2. Table 1, Confirmatory Measurements Program Results, 3rd quarter, 1981.

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: ZION
FOR THE 3 QUARTER OF 1981

		------NRC-------		---LICENSEE-----		---NRC:LICENSEE----		
SAMPLE	ISOTOPE	RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
OFF GAS	XE 133	5.0E-05	4.8E-07	6.0E-05	7.0E-07	1.2E+00	1.0E+02	A
	XE 135	1.4E-06	9.4E-08	1.5E-06	2.2E-07	1.1E+00	1.5E+01	A
L WASTE	CO 58	1.9E-05	3.1E-07	1.9E-05	4.6E-07	1.0E+00	6.1E+01	A
	CO 60	1.4E-05	3.1E-07	1.4E-05	2.7E-07	1.0E+00	4.5E+01	A
	I 131	3.2E-06	1.3E-07	2.7E-06	2.3E-07	8.4E-01	2.5E+01	A
	GAMMA A	1.0E-06	1.2E-07	8.9E-07	1.7E-07	8.9E-01	8.3E+00	A
	XE 133	3.7E-05	3.7E-07	3.9E-05	7.1E-07	1.1E+00	1.0E+02	A
P FILTER	CS 137	1.2E-04	9.1E-06	1.3E-04	1.2E-05	1.1E+00	1.3E+01	A
	CO 58	1.2E-03	2.1E-05	1.1E-03	3.6E-05	9.2E-01	5.7E+01	A
	CO 60	1.6E-03	2.9E-05	1.6E-03	3.0E-05	1.0E+00	5.5E+01	A
C FILTER	I 131	6.9E-04	1.4E-05	1.1E-03	2.9E-05	1.6E+00	4.9E+01	P
	I 131	6.9E-02	1.3E-04	1.1E-01	2.8E-04	1.6E+00	5.3E+02	D
	I 133	1.7E-02	8.9E-05	2.6E-02	1.7E-04	1.5E+00	1.9E+02	D
	I 135	1.9E-03	1.5E-04	2.7E-03	1.4E-04	1.4E+00	1.3E+01	A
C SPIKED	CO 57	5.8E-03	2.6E-04	9.5E-03	4.0E-04	1.6E+00	2.2E+01	P
	CS 137	3.1E-02	1.3E-03	5.0E-02	6.8E-04	1.6E+00	2.4E+01	P
	GAMMA A	7.5E-02	3.2E-03	1.3E-01	8.0E-03	1.7E+00	2.3E+01	D
	CO 60	4.4E-02	1.8E-03	6.6E-02	7.3E-04	1.5E+00	2.4E+01	P

T TEST RESULTS:
A=AGREEMENT
D=DISAGREEMENT
P=POSSIBLE AGREEMENT
N=NO COMPARISON