

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

REGION III

Report No. 50-295/80-04; 50-304/80-03

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, Unit 1 and 2

Inspection At: Zion Site, Zion, Illinois

Inspector: *A. G. Januska*
A. G. Januska

Approved By: *W B Drant for*
T. H. Essig, Chief
Environmental and Special
Projects Section

5/6/80
5/6/80

Inspection Summary

Inspection on March 18, 1980 (Report No. 50-295/80-04; 50-304/80-03)

Areas Inspected: Nonroutine, announced inspection of confirmatory measurements program including (1) a discussion of confirmatory measurement results from a previous sample collection, which included the submission of spiked samples, and (2) the collection of effluent samples and the submission of spiked samples for future comparative analyses. The inspection involved 8.5 inspector-hours on site by one NRC inspector.

Results: Within the areas inspected no apparent deviations or items of noncompliance were noted.

DETAILS

1. Persons Contacted

- *N. Wandke, Station Superintendent
- *L. Soth, Assistant Superintendent - Operations
- *G. Pimpl, Administrative Assistant
- *S. Gurunathan, Engineer
- S. Miller, Rad/Chem Supervisor
- J. Firoved, Engineering Assistant
- P. Zwilling, Chemist

*Denotes those present at the exit interview.

2. Results of Comparative Analyses

Results of comparative analyses performed on effluent samples split onsite and spiked samples submitted in May 1979 are shown on Table I. Preliminary results (incomplete) of samples split onsite and spiked samples submitted during this inspection are shown on Table II. The criteria for comparing measurement results are given in Attachment 1. For 33 sample comparisons of the samples collected or split in May 1979, the licensee's results yielded 17 agreements or possible agreements. The results were discussed with the licensee. The licensee failed to identify Kr-85 and correctly quantify Xe-133 in the offgas sample, failed to identify Co-57 in one spiked liquid sample and Co-60 in another, and only correctly quantified Cs-134 of the remaining nuclides present and failed to accurately quantify Co-57 in one of two spiked charcoal samples. The licensee stated that counting anomalies were noted about the time of the liquid spike sample counting. These anomalies were determined by the licensee as a result of an instrument check and documented. The results of the check were reviewed by the inspector. The licensee stated that representatives of the counting equipment company were called and attempted to repair the unit. It was determined that computer hardware was the problem. The licensee has since replaced his counting equipment with new units and upgraded software. As a result of the problem and to verify that the problem was entirely the fault of the equipment, samples were collected during this inspection and spiked samples submitted to the licensee. The results, on Table II are incomplete but are reported as a test of the licensee's new system. For 29 sample comparisons the licensee's results yielded 26 agreements or possible agreements. The licensee failed to accurately quantify Cs-134 and identify Mn-54 on the particulate filter and accurately quantify one of three Ba-133 (mock I) results on spiked charcoal filters.

In comparing overall results between Tables I and II, there is a slight decrease in the accuracy of the particulate filter, an increase in the accuracy of the offgas and significant increases in the accuracy of the spiked liquid and charcoal samples.

Releases reported during the period of defective counting equipment would not have exceeded Technical Specifications. Strontium results were not available in the 1979 Annual Report for the quarter in which this problem existed. These results will be examined as soon as they are reported.

3. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on March 18, 1980. The inspector summarized the scope and findings of the inspection specifically noting the instrument problem which had been determined by the licensee.

TABLE I

U S NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
CONFIRMATORY MEASUREMENTS PROGRAM
FACILITY: ZION
FOR THE 2 QUARTER OF 1979

SAMPLE	ISOTOPE	-----NRC-----		---LICENSEE---		---NRC:LICENSEE---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
OFF GAS	XE 133	5.1E-03	2.0E-04	1.5E-03	0.0	2.9E-01	2.6E+01	
	KR 85	1.4E-03	1.4E-04	0.0	0.0	0.0	1.0E+01	
P FILTER	I 131	8.8E-05	1.7E-05	1.2E-04	0.0	1.4E+00	5.2E+00	
	CS 134	1.9E-04	1.1E-05	1.4E-04	0.0	7.4E-01	1.7E+01	
	CS 137	3.6E-04	1.7E-05	2.5E-04	0.0	6.9E-01	2.1E+01	
C FILTER	I 131	1.8E-03	9.6E-05	1.3E-05	0.0	7.2E-03	1.9E+01	
F SPIKED	CO 57	6.3E-04	2.0E-05	4.5E-04	0.0	7.1E-01	3.1E+01	
	CS 134	1.4E-03	5.0E-05	1.8E-03	0.0	1.3E+00	2.8E+01	
	CS 137	4.1E-03	1.2E-04	4.1E-03	0.0	1.0E+00	3.4E+01	
	CO 60	2.1E-03	6.0E-05	2.2E-03	0.0	1.0E+00	3.5E+01	
L SPIKED	SF 89	4.7E-03	1.5E-04	2.3E-06	3.0E-07	4.9E-04	3.1E+01	D
	SR 90	2.9E-04	1.2E-05	5.0E-06	9.0E-07	1.7E-02	2.4E+01	D
	H 3	6.7E-03	1.2E-04	1.8E-02	0.0	2.7E+00	5.6E+01	
	CO 57	7.9E-05	2.3E-06	0.0	0.0	0.0	3.4E+01	
	CS 134	1.4E-04	4.0E-06	1.2E-04	0.0	8.6E-01	3.5E+01	
	CS 137	4.2E-04	1.2E-05	1.8E-04	0.0	4.3E-01	3.5E+01	
	CO 60	2.2E-04	6.0E-06	6.7E-04	0.0	3.0E+00	3.7E+01	
	SR 89	9.4E-04	3.0E-05	7.9E-07	1.6E-07	8.4E-04	3.1E+01	D
	SF 90	5.7E-05	2.4E-06	1.9E-07	5.9E-08	3.3E-03	2.4E+01	D
	H 3	1.3E-03	3.0E-05	8.7E-03	0.0	6.7E+00	4.3E+01	
	CS 134	2.8E-05	8.0E-07	3.6E-04	0.0	1.3E+01	3.5E+01	
	CS 137	8.5E-05	2.4E-06	4.7E-04	0.0	5.5E+00	3.5E+01	
	CO 60	4.4E+05	1.2E-06	0.0	0.0	0.0	3.7E+01	
C SPIKED	BA 133	6.7E+04	2.0E+03	9.4E+04	0.0	1.4E+00	3.4E+01	
	CO 57	2.2E-03	9.0E-05	1.3E-03	0.0	5.9E-01	2.4E+01	
	CS 134	8.2E-03	3.0E-04	5.8E-03	0.0	7.1E-01	2.7E+01	
	CS 137	2.3E-02	7.0E-04	1.6E-02	0.0	7.0E-01	3.3E+01	
	CO 60	1.3E-02	5.0E-04	9.6E-03	0.0	7.4E-01	2.6E+01	
	BA 133	2.9E+05	8.0E+03	2.8E+05	0.0	9.7E-01	3.6E+01	
	CO 57	4.2E-03	2.0E-04	2.0E-03	0.0	4.8E-01	2.1E+01	
	CS 134	1.5E-02	5.0E-04	1.0E-02	0.0	6.7E-01	3.0E+01	
	CS 137	4.1E-02	1.0E-03	2.9E-02	0.0	7.1E-01	4.1E+01	
	CO 60	2.3E-02	7.0E-04	1.7E-02	0.0	7.4E-01	3.3E+01	

T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

P=POSSIBLE AGREEMENT

N=NO COMPARISON

TABLE II

U S NUCLEAR REGULATORY COMMISSION
 OFFICE OF INSPECTION AND ENFORCEMENT
 CONFIRMATORY MEASUREMENTS PROGRAM
 FACILITY: ZION
 FOR THE 1 QUARTER OF 1980

SAMPLE	ISOTOPE	-----NRC-----		---LICENSEE---		---NRC:LICENSEE---		
		RESULT	ERROR	RESULT	ERROR	RATIO	RES	T
OFF GAS	KR 85	2.5E-03	2.0E-04	1.9E-03	0.0	7.6E-01	1.3E+01	A
L WASTE	BETA	2.3E-06	1.0E-07	4.1E-06	0.0	1.8E+00	2.3E+01	P
	H 3	3.5E-02	2.0E-04	2.9E-02	0.0	8.3E-01	1.8E+02	A
P FILTER	CS 134	2.7E-04	1.6E-05	4.7E-04	0.0	1.7E+00	1.7E+01	D
	CS 137	5.6E-04	2.5E-05	9.2E-04	0.0	1.6E+00	2.2E+01	P
	MP 54	1.6E-04	1.7E-05	0.0	0.0	0.0	9.4E+00	L
	ZN 65	9.3E-05	3.3E-05	0.0	0.0	0.0	2.8E+00	N
	CO 60	2.4E-03	8.1E-05	2.1E-03	0.0	1.3E+00	3.0E+01	A
C FILTER	I 131	5.6E-02	1.6E-03	6.6E-02	0.0	1.2E+00	3.5E+01	A
	I 133	7.3E-02	7.9E-03	9.2E-02	0.0	1.3E+00	9.2E+00	A
F SPIKED	CO 57	6.3E-04	2.0E-05	7.1E-04	0.0	1.1E+00	3.1E+01	A
	CS 134	1.4E-03	5.0E-05	1.5E-03	0.0	1.1E+00	2.8E+01	A
	CS 137	4.1E-03	1.2E-04	3.9E-03	0.0	9.5E-01	3.4E+01	A
	CO 60	2.1E-03	6.0E-05	2.2E-03	0.0	1.0E+00	3.5E+01	A
L SPIKED	H 3	6.3E-03	6.0E-05	4.7E-03	0.0	7.5E-01	1.0E+02	P
	CO 57	1.6E-04	5.0E-05	1.2E-04	0.0	6.3E-01	3.2E+01	P
	CS 134	8.6E-04	2.4E-05	7.1E-04	0.0	6.3E-01	3.6E+01	A
	CO 60	1.1E-03	3.0E-05	1.0E-03	0.0	9.1E-01	3.7E+01	A
C SPIKED	BA 133	2.9E+05	8.0E+03	2.4E+05	0.0	8.3E-01	3.6E+01	A
	CO 57	4.2E-03	2.0E-04	4.3E-03	0.0	1.0E+00	2.1E+01	A
	CS 134	1.5E-02	5.0E-04	1.3E-02	0.0	8.7E-01	3.0E+01	A
	CS 137	4.1E-02	1.0E-03	4.2E-02	0.0	1.0E+00	4.1E+01	A
	CO 60	2.3E-02	7.0E-04	2.4E-02	0.0	1.0E+00	3.3E+01	A
	BA 133	6.7E+04	2.0E+03	7.1E+04	0.0	1.1E+00	3.4E+01	A
	CO 57	2.2E-03	9.0E-05	1.9E-03	0.0	8.6E-01	2.4E+01	A
	CS 134	8.2E-03	3.0E-04	8.3E-03	0.0	1.0E+00	2.7E+01	A
	CS 137	2.3E-02	7.0E-04	2.2E-02	0.0	9.6E-01	3.3E+01	A
	CO 60	1.3E-02	5.0E-04	1.3E-02	0.0	1.0E+00	2.6E+01	A
	BA 133	3.4E+04	1.7E+03	8.1E+04	0.0	2.4E+00	2.0E+01	D
	BA 133	7.6E+04	3.0E+03	6.9E+04	0.0	9.1E-01	2.5E+01	A

T TEST RESULTS:

A=AGREEMENT

D=DISAGREEMENT

P=POSSIBLE AGREEMENT.

N=NO COMPAPISON

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.

<u>RESOLUTION</u>	<u>RATIO = LICENSEE VALUE/NRC REFERENCE VALUE</u>		
	<u>Agreement</u>	<u>Possible Agreement "A"</u>	<u>Possible Agreeable "B"</u>
<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.