

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
799 ROOSEVELT ROAD
GLEN ELLYN, ILLINOIS 60137

SEP 1 1976

Commonwealth Edison Company
ATTN: Mr. Byron Lee, Jr.
Vice President
P. O. Box 767
Chicago, Illinois 60690

Docket No. 50-10
Docket No. 50-237
Docket No. 50-249
Docket No. 50-254
Docket No. 50-265
Docket No. 50-295
Docket No. 50-304

Gentlemen:

As you are aware, the NRC conducts a nationwide Confirmatory Measurements Program at nuclear power facilities. This program consists of tests of licensee measurements of radioactivity in actual or simulated plant effluent samples, comparing the licensee's measurements to those of our NRC reference laboratory. The measurements made by the NRC reference laboratory are traceable to the National Bureau of Standards' Radioactivity Measurements System by laboratory intercomparisons.

The NRC's Office of Inspection and Enforcement has been conducting the confirmatory measurements program with nuclear power facilities since 1973. In the past, inspectors have discussed changes in the program with your staff during the course of their confirmatory measurements inspections. In order to update your information and assist you in evaluating your facility's performance, we have prepared the enclosed review of our present Confirmatory Measurements Program.



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We consider acceptable results in this program to be of significant importance, and request your continued cooperation. We will gladly discuss any questions concerning this matter.

Sincerely yours,

James G. Keppler
Regional Director

Enclosure:
Confirmatory Measurements
Program

cc w/encl:
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Station Superintendent
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CONFIRMATORY MEASUREMENTS PROGRAM

I. Introduction

The following information has been compiled for the information of licensees in NRC Region III to assist in developing a more uniform basis of laboratory comparisons in the conduct of the NRC Confirmatory Measurements Program.

II. NRC Reference Laboratory Analysis

The following counting times and instrumentation are generally used by the NRC Reference Laboratory:

<u>Media</u>	<u>Analysis</u>	<u>Instrumentation</u>	<u>Count Time*</u>
Liquid	Gross Beta	Proportional	20 minutes
	H-3	Liquid scintillation	10 minutes
	Sr-90, total Sr	Proportional	20 minutes
	Gamma Spec	GeLi	60 minutes
Gas	Gamma Spec	GeLi	60 minutes
Particulate filter	Gamma Spec	GeLi	60 minutes
Charcoal Adsorber	Gamma Spec	GeLi	60 minutes

*or 20,000 counts.

III. Limits for Detectability

The reported NRC reference laboratory results are reviewed to determine if the results are above specific limits for detectability (LD). Values below the LD are not used for comparison purposes. These LD values are as follows:

1. Liquid and Gas

Specific radionuclide concentrations of 10% of their MPC in 10 CFR 20, Table II, Column B, of more restrictive value of soluble or insoluble limit.

2. Particulate Filter and Charcoal Adsorber

Specific radionuclide activity present on filter ($\mu\text{Ci/sample}$) at the following levels:

<u>Isotope</u>	<u>LD</u>	<u>Isotope</u>	<u>LD</u>
Cr-51	1 x 10 ⁻⁴	Mo-99	10 ⁻⁵
Mn-54	1.5 x 10 ⁻⁵	I-131	2 x 10 ⁻⁵
Co-57	2 x 10 ⁻⁵	Cs-134	2 x 10 ⁻⁵
Co-58	1.5 x 10 ⁻⁵	Cs-137	2 x 10 ⁻⁵
Co-60	3 x 10 ⁻⁵	Ba-140	2 x 10 ⁻⁵
Fe-59	3 x 10 ⁻⁵	La-140	4 x 10 ⁻⁵
Sn-65	3 x 10 ⁻⁵	Ce-141	2 x 10 ⁻⁴
Sr-89	1 x 10 ⁻⁵	Ce-144	1 x 10 ⁻⁴
Sr-90	2 x 10 ⁻⁶	ZrNb-95	4 x 10 ⁻⁵

IV. Decay Correction

NRC reference laboratory samples are counted approximately ten (10) days from sample collection.

Gross beta analysis is performed by both licensee and NRC reference laboratory on liquid samples at a pre-specified date approximately three (3) weeks from sample collection.

Gas samples should be retained by licensees for recounting two (2) to six (6) days after sample collection. Experience has shown that Xe-135 will mask Xe-133m and Kr-85 identification and quantification.

La-140 is presently not decay corrected to time of sampling by the NRC reference laboratory. Comparisons with La-140 are presently made for information purposes only.

V. Acceptance Criteria

Attachment 1 - "Criteria for Comparing Analytical Measurements" is utilized to determine whether results are in the agreement, disagreement, possible agreement, or no comparison category. For all NRC reference laboratory results above the LD, comparisons which are in 'agreement' or 'possible agreement' are considered acceptable, while 'disagreement' or 'not reported by licensee' are considered unacceptable.

VI. Reporting of Results

Results from the licensee's analytical measurements are to be received by NRC IE:III within 45 days of sample collection.

VII. Reports

Information on the NRC reference laboratory's and licensee's results are analyzed by the NRC Computer Data Analysis System. The completed report, example in Table I, is submitted to the licensee by the inspector during the exit interview of the Confirmatory Measurements Inspection.

As seen in Table I, results are provided for each sample by isotope. The respective parameters are:

1. NRC reference laboratory result and error (uncertainty).
2. Licensee result and error (uncertainty).
3. NRC and Licensee results and errors are reported in units of:

$\mu\text{Ci/cc}$ for gas samples

$\mu\text{Ci/ml}$ for liquid samples

$\mu\text{Ci/sample}$ for particulate filters and charcoal adsorbers

4. Z Value

This parameter was utilized in 1973 as part of the statistical comparison test criteria. The Z value is included for those licensees desiring additional statistical information about the reported values.

$$Z \text{ value} = (X_1 - X_2) / (\sigma_1^2 + \sigma_2^2)^{1/2}$$

where X_1 = NRC value
 X_2 = Licensee value
 σ_1 = NRC error
 σ_2 = Licensee error

5. PCT

The percentage parameter was utilized in 1973 as part of the statistical comparison test criteria. Percentage (PCT) is included for those licensees desiring additional statistical information.

$$\text{PCT} = (100) (X_1 - X_2) / X_1$$

6. RAT

The ratio (RAT) is defined in Attachment 1 as:

$$\text{RAT} = \bar{X}_2 / \bar{X}_1$$

7. RES

The resolution (RES) is defined in Attachment 1 as:

$$\text{RES} = \bar{X}_1 / \sigma_1$$

8. T

The test result (T) is defined in Table 1 as:

A = Agreement
P = Possible Agreement
N = No Comparison
D = Disagreement

Attachments:

1. Attachment 1, Criteria for Comparing Analytical Measurements
2. Table 1, Confirmatory Measurements Program

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 Agreement "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 <50	0.75 - 1.33	0.6 - 1.67	0.5 - 2.0
>50 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.

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U S ANTI-COMMUNISM ACTIVITY COMMISSION
 OFFICE OF INSPECTOR AND ENFORCEMENT
 COMPILED BY MEASUREMENTS PROGRAM
 FACILITY:
 FOR THE 3 MONTHS END OF 1976

SAMPLE ISOTOPE	RESULT	ERROR	U-TRANSFORM	RESULT	Z VALUE	PGT	PGT TO	Z-S	T
50 44	2.7E-02	1.4E-03	6.8E-02	7.0E-06	2.6E+01	1.5E+02	2.5E+00	1.8E+01	0
50 40	3.0E-03	1.2E-04	8.1E-06	1.0E-06	1.4E+01	7.3E+01	2.7E+01	2.5E+01	0
1 131	6.7E-05	2.0E-06	6.1E-05	6.0E-06	1.3E+00	9.0E+00	9.1E-01	3.6E+01	A
1A 130	7.7E-06	3.0E-07	2.1E-05	2.0E-06	5.6E+00	1.7E+02	2.7E+00	2.5E+01	0
4A 140	1.7E-05	3.0E-06	2.0E-05	2.0E-06	8.3E-01	1.8E+01	1.2E+00	5.7E+00	A
CS 136	6.4E-05	5.0E-07	3.9E-05	3.0E-06	1.6E+00	1.1E+01	8.9E-01	8.1E+01	A
CS 137	9.3E-05	7.0E-07	6.9E-05	5.0E-06	2.8E+00	1.7E+01	2.8E-01	1.2E+02	A
2 60	7.2E-05	5.0E-07	5.7E-05	6.0E-06	3.7E+00	2.1E+01	7.9E-01	3.0E+01	2
051A	2.1E-06	6.0E-06	1.8E-06	3.0E-06	6.0E+00	1.6E+01	8.6E-01	5.2E+01	A
0 3	2.5E-03	1.0E-05	2.2E-03	2.0E-06	1.5E+00	1.2E+01	9.1E-01	2.5E+02	A
YE 133	1.3E-01	6.0E-03	1.9E-01	3.0E-02	2.0E+00	6.5E+01	1.5E+00	2.2E+01	2
YE 132	9.1E-03	6.0E-04	9.0E-04	1.0E-03	9.3E-02	1.1E+00	9.6E-01	2.3E+01	A
YE 135	2.5E-01	6.0E-02	3.7E-01	5.0E-02	1.6E+00	4.8E+01	1.5E+00	6.2E+00	A
YE 133	1.3E-01	6.0E-03	1.6E-01	3.0E-02	2.0E+00	6.6E+01	1.5E+00	2.7E+01	2
YE 133A	9.1E-03	6.0E-04	8.9E-03	1.0E-03	1.0E+00	1.2E+01	3.2E-01	2.2E+01	A
YE 135	2.5E-01	6.0E-02	3.7E-01	6.0E-02	1.6E+00	6.9E+01	1.5E+00	6.2E+00	A
1 131	1.6E-06	3.0E-05	2.3E-06	3.0E-06	1.6E+00	6.6E+01	1.6E+00	5.3E+00	A
1 131	1.8E-01	1.0E-03	1.5E-01	2.0E-02	1.5E+00	1.7E+01	5.3E-01	1.2E+02	A

SAMPLE COPY

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