

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-352/86-10

Docket No. 50-352

License No. CPPR-106 Priority - Category B

Licensee: Philadelphia Electric Company

2301 Market Street

Philadelphia, Pennsylvania 19101

Facility Name: Limerick Generating Station, Unit 1

Inspection At: Limerick, Pennsylvania

Inspection Conducted: May 19-21, 1986

Inspectors: Harvey Zibulsky 6-2-86
H. Zibulsky, Chemist date

Approved by: W. J. Pasciak 6/4/86
W. J. Pasciak, Chief, Effluents Radiation date
Protection Section, DRSS

Inspection Summary: Inspection on May 19-21, 1986 (Report No. 50-352/86-10)

Areas Inspected: Routine, announced inspection of the nonradiological chemistry program. Areas reviewed included measurement control and analytical procedure evaluations.

Results: No violations were identified.

DETAILS

1. Individuals Contacted

J. Wiley, Senior Chemist
J. Sabados, Supervisory Chemist
J. Rogan, Supervisory Chemist (Corporate)
E. Frick, Chemist

All were present at the exit interview.

The inspector also interviewed other licensee employees including members of the Chemistry staff.

2. Action on Previous Licensee Findings

(Closed) 50-352/84-58-01 IFI - Control standards were not used or documented on control charts. The licensee has generated and are utilizing control charts.

(Open) 25-00-13 TI - The inspection covered part of this item. Of the two modules included in the TI, Module 79501 was completed.

3. Measurement Control Evaluation

The licensee's measurement control program will be verified through analysis of actual plant water samples. Samples from the boric acid storage tank, demin water and Ultrex were taken and duplicate samples were sent to Brookhaven National Laboratory (BNL) for independent verification. The licensee will determine boron on the storage tank by specific gravity and BNL will determine the boron by the mannitol titration method. Metal analyses will be performed on the demin and Ultrex samples. On completion of the analyses by both laboratories, a statistical evaluation will be made (Inspector Follow-up Item 50-352/86-10-01).

The inspector reviewed the measurement control charts. Some of the charts were generated with an arbitrary $\pm 10\%$ acceptance criteria. The inspector recommended a ± 2 sigma alert criteria and a ± 3 sigma acceptance parameter as was discussed in report number 50-352/84-58. It was also suggested that more control charts be generated for those analytes whose parameters are mentioned in the fuel warranty and vendor requirements. The licensee agreed to generate the necessary control charts.

4. Analytical Procedures Evaluation

During the inspection, standard chemical solutions were submitted by the inspector to the licensee for analysis. The standard solutions were prepared by BNL for NRC Region 1, and were analyzed by the licensee using

normal methods and equipment. The analysis of standards is used to verify the various plant systems with respect to Technical Specification and other regulatory requirements. In addition, the analysis of standards is used to evaluate the licensee's analytical procedures with respect to accuracy and precision.

The results of the standard measurements comparison indicated that six out of fourteen comparisons were in disagreement under the criteria used for comparing results (see Attachment 1). The disagreements were copper, nickel and chromium analyzed with the direct current plasma emission spectrometer. The disagreements occurred with the samples that were diluted ten times more than the samples that were in agreement. The licensee will investigate the reason for the disagreements. Two possibilities will be explored. Either the calibration standard used was too high a concentration for the NRC standards or the demin water used for dilution was contaminated. Split samples of the demin water were taken for analyses of the metals.

More NRC blind samples will be submitted to the licensee for analyses when their investigation is completed (Inspector Follow-up Item 50-352/86-10-02). A comparison wasn't made on a chloride analysis because the result was less than the licensee's lowest standard.

5. Exit Interview

The inspector met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on May 21, 1986, and summarized the scope and findings of the inspection. At no time during this inspection was written material provided to the licensee by the inspector.

Capability Test Results

Limerick Generating Station, Unit 1

<u>Chemical Parameter</u>	<u>NRC Value</u>	<u>Lic. Value</u>	<u>Ratio (Lic./NRC)</u>	<u>Comparison</u>
Results in parts per billion (ppb)				
Chloride	20.6+1.4	<20	---	---
	69.7+3.0	65.7+2.1	0.94+0.05	Agreement
	27.7+2.8	28.0+2.0	1.0	Agreement
Iron	51.2+3.6	59.4+1.4	1.16+0.09	Agreement
	13.7+0.8	13.9+1.6	1.0	Agreement
	9.6+0.4	9.5-0.9	1.0	Agreement
Copper	53.2+0.4	57.5+2.7	1.08+0.05	Agreement
	15.4+0.2	41.2+1.5	2.68	Disagreement
	10.4+0.2	26.6+2.5	2.56	Disagreement
Nickel	52.8+6.4	60.7+1.3	1.15+0.14	Agreement
	15.2+0.3	23.1+0.7	1.52	Disagreement
	10.3+0.5	16.2+0.7	1.57	Disagreement
Chromium	48.0+4.0	59.5+0.6	1.24+0.10	Disagreement
	15.0+1.1	18.0+0.7	1.20+0.10	Agreement
	10.8+0.2	12.8+0.8	1.19+0.08	Disagreement

ATTACHMENT

Criteria For Comparing Analytical Measurements

This attachment provides criteria for comparing results of capability tests. In these criteria the judgement limits are based on the uncertainty of the ratio of the licensee's value to the NRC value. The following steps are performed:

- (1) the ratio of the licensee's value to the NRC value is computed

$$\text{(ratio} = \frac{\text{Licensee Value}}{\text{NRC Value}} \text{)};$$

- (2) the uncertainty of the ratio is propagated.¹

If the absolute value of one minus the ratio is less than or equal to twice the ratio uncertainty, the results are in agreement.
($|1 - \text{ratio}| \leq 2 \text{ uncertainty}$)

$$^1 \quad Z = \frac{x}{y}, \text{ then } \frac{S_z^2}{Z^2} = \frac{S_x^2}{x^2} + \frac{S_y^2}{y^2}$$

(From: Bevington, P. R., Data Reduction and Error Analysis for the Physical Sciences, McGraw-Hill, New York, 1969)