U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-387/85-27
50-388/85-22

Docket No. 50-387
50-388

License No. NPF-14
CPPR-102 Priority -- Category C
B

Licensee: Pensylvania Power and Light Co.

2 North Ninth Street

Allentown, Pennsylvania 18101

Facility Name: Susquehanna Steam Electric Station, Units 1 and 2

Inspection At: Berwick, Pennsylvania

Inspection Conducted: September 17-20, 1985

Inspectors: Harvey Zibulsky 10-9-85
H. Zibulsky, Chemist date

Approved by: W. J. Pasciak 10/11/85
W. J. Pasciak, Chief, BWR Radiation Protection Section, DRSS date

Inspection Summary: Inspection on September 17-20, 1985 (Combined Report Nos. 50-387/85-27, 50-388/85-22)

Areas Inspected: Routine, announced inspection of the nonradiological chemistry program. Areas reviewed included measurement control and analytical procedures evaluations. The inspection involved 27 inspector hours by one NRC region based inspector.

Results: No violations were identified.

## DETAILS

1. Individuals Contacted

*T. Crimmins, Plant Superintendent
*W. Barberich, Manager, Nuclear Licensing
*R. Prego, QA Supervisor - Operations
*R. Harris, Senior Licensing Specialist
*D. McGann, Compliance Engineer
*E. Appel, SSES - Chemistry
*R. Paley, Compliance Engineer
R. Doebler, Chemistry Supervisor
J. Blakeslee, Health Physics/Chemistry Supervisor
P. Treier, Assistant Chemistry Foreman
M. Alper, Chemist Technician QA Program

*denotes those present at the exit interview.

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

2. Measurement Control Evaluation

This program verifies the licensee's measurement capabilities on actual plant water samples. The radwaste tank, standby liquid control tank, and filters from the condensate and reactor water are sampled and duplicate samples are obtained and sent to the Brookhaven National Laboratory (BNL) for independent verification of analysis. Chloride and silica analyses will be performed on the radwaste tanks, boron analysis on the standby liquid control tanks, and iron, copper, nickel, and chromium analyses on the acid digested filters. On completion of the analyses by both laboratories, a statistical evaluation will be made (Inspector Follow-up Item 50-387/85-27-01 and 50-388/85-22-01).

3. Analytical Procedures Evaluation

During the inspection, standard chemical solutions were submitted to the licensee for analysis. The standard solutions were prepared by the Brookhaven National Laboratory for the NRC Region I, and the standards were analyzed by the licensee using normal methods and equipment. The analysis of standards is used to verify the licensee's capability to monitor chemical parameters in various plant systems with respect to Technical Specification requirements 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, with the exception of three measurements, all of the results were in agreement under the criteria used for comparing results (see Attachment 1). The results of the comparisons are listed in Table 1.

While observing the licensee analyzing nickel, copper, chronium, and iron using the atomic absorption procedure, a one point calibration was made. The inspector advised the licensee that a one point calibration was poor laboratory practice because a change in the slope of the calibration curve would be very difficult to identify. A minimum of two points is necessary to generate a reliable calibration curve. The licensee stated that they would investigate this problem.

While reviewing the licensee's procedures, the inspector identified that some of the analytical procedures were not complete as they did not have the reagent preparations included. There was a separate procedure for required reagents. In the case of the boron mannitol titration procedure, five separate reagent preparation procedures are needed for a technician to perform the analysis. The inspector identified that this could lead to problems. The licensee stated that they would consider rewriting some of the procedures to incorporate the reagent preparation procedures.

The inspector reviewed the measurement control charts for chloride, silica, and iron. The inspector suggested that control charts be generated for boron, nickel, copper, and chromium, and that any measurement required in the Technical Specifications and fuel warranty should have a control chart. The licensee said that they will generate the charts.

No violations were identified.

4. Exit Interview

The inspector met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on September 20, 1985, 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

## Susquehanna, Units 1 and 2

Results in parts per million (ppm)

| Chemical Parameters | NRC Value | Licensee Value | Ratio (Lic/NRC) | Comparison |
|---|---|---|---|---|
| Boron (mannitol) | 101.4 ± 7 | 99.1 ± 2.4 | 0.977 ± 0.07 | Agreement |
| | 60.9 ± 4 | 59.7 ± 0.8 | 0.98 ± 0.07 | Agreement |
| | 252 ±10 | 241.7 ± 0.3 | 0.96 ± 0.04 | Agreement |
| Copper | 1.03 ± 0.01 | 1.02 ± 0.02 | 0.99 ± 0.02 | Agreement |
| | 2.07 ± 0.04 | 2.09 ± 0.04 | 1.01 ± 0.03 | Agreement |
| | 3.10 ± 0.04 | 2.99 ± 0.02 | 0.96 ± 0.01 | Disagreement |
| Iron | 1.01 ± 0.09 | 1.01 ± 0.01 | 1 | Agreement |
| | 2.03 ± 0.10 | 1.95 ± 0.02 | 0.96 ± 0.05 | Agreement |
| | 3.04 ± 0.21 | 2.93 ± 0.05 | 0.96 ± 0.07 | Agreement |
| Nickel | 1.05 ± 0.16 | 1.0 ± 0.01 | 0.95 ± 0.15 | Agreement |
| | 2.10 ± 0.13 | 2.06 ± 0.01 | 0.98 ± 0.06 | Agreement |
| | 3.14 ± 0.07 | 3.10 ± 0.03 | 0.99 ± 0.02 | Agreement |
| Chromium | 1.01 ± 0.10 | 0.90 ± 0.01 | 0.89 ± 0.09 | Agreement |
| | 2.00 ± 0.05 | 1.85 ± 0.01 | 0.93 ± 0.02 | Disagreement |
| | 3.02 ± 0.28 | 2.77 ± 0.05 | 0.92 ± 0.09 | Agreement |

Results in parts per billion (ppb)

| | | | | |
|---|---|---|---|---|
| Chloride (specific ion electrode) | 2.06 ± 0.7 | 27.7 ± 3.1 | 1.34 ± 0.16 | Agreement |
| | 69.7 ± 3 | 72 ± 2.6 | 1.03 ± 0.06 | Agreement |
| | 27.7 ± 2.8 | 39.3 ± 3.2 | 1.42 ± 0.18 | 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 (ratio=$\frac{\text{Licensee Value}}{\text{NRC value}}$); (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. ($|1-\text{ratio}| \leq 2$ uncertainty)

1 $Z\frac{X}{Y}$, then $\frac{Sz^2}{Z^2} = \frac{Sx^2}{X^2} + \frac{Sy^2}{Y^2}$

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