

U.S. NUCLEAR REGULATORY COMMISSION  
REGION I

Report No. 50-271/85-38

Docket No. 50-271

License No. DPR-28 Priority - Category C

Licensee: Vermont Yankee Nuclear Power Corporation  
R.D. 5, Box 169, Ferry Road  
Brattleboro, Vermont 05301

Facility Name: Vermont Yankee Nuclear Power Station

Inspection At: Vernon, Vermont

Inspection Conducted: December 3-5, 1985

Inspector: Harvey Zibulsky 1-13-86  
H. Zibulsky, Chemist date

Approved by: W. J. Pasciak 1/21/86  
W. J. Pasciak, Chief, BWR Radiation date  
Protection Section, DRSS

Inspection Summary: Inspection on December 3-5, 1985 (Report No. 50-271/85-38)

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

Results: No violations were identified.

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## DETAILS

### 1. Individuals Contacted

- \*J. Pelletier, Plant Manager
- \*M. Prystupa, Plant Chemist
- S. Jefferson, Assistant Plant Manager
- R. Leach, Chemistry and Health Physics Supervisor

\*Denotes those present at the exit interview.

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

### 2. Action on Previous Licensee Findings

(Open) 85-03-01 IFI (84725) - The licensee did not have a measurement control program with independent standards for calibration and control. The licensee initiated a measurement control program, but control charts for boron, chloride (electrode), iron, nickel, copper, and chromium are needed. This item will remain open.

(Open) 25-00-13 TI - The Temporary Instruction includes Modules 79501 and 79502. The inspection completed Module 79501.

### 3. Measurement Control Evaluation

The licensee's measurement control program was verified through analysis of actual plant water samples. The standby liquid control tank and well water were sampled and duplicate samples were sent to Brookhaven National Laboratory (BNL) for independent verification. Boron analysis will be performed on the standby liquid control tank sample and chloride, silica, iron, nickel, copper, and chromium analyses on the well water sample. On completion of the analyses by both laboratories, a statistical evaluation will be made (Inspector Follow-up Item 85-38-01).

### 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 I, and 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 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 three out of twenty-one analyses were not in agreement under the criteria used for comparing results (see Attachment 1). The disagreements are not considered significant. The differences are less than 6% of the accepted value. The results of the comparisons are listed in Table 1.

5. Exit Interview

The inspector met with the licensee representatives (denoted in paragraph 1) at the conclusion of the inspection on December 5, 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

VERMONT YANKEE NUCLEAR POWER STATION

<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 (Specific Ion Electrode)	27.7±2.8	23.3±2.9	0.84±0.13	Agreement
	20.6±1.4	20.0±0	0.97±0.07	Agreement
	139.4±6	128.3±2.9	0.92±0.04	Agreement
Chloride (Ion Chromatography)	27.7±2.8	28.9±0.4	1.04±0.11	Agreement
	20.6±1.4	21.7±0.4	1.05±0.07	Agreement
	69.7±3	65.9±1.7	0.95±0.05	Agreement
Results in parts per million (ppm)				
Boron	1014±15	1006±6.9	0.99±0.02	Agreement
	5040±130	4945±58	0.98±0.03	Agreement
	3047±26	2923±63	0.96±0.02	Agreement
Iron	3.43±0.21	3.53±0.05	1.03±0.06	Agreement
	2.39±0.10	2.30±0.01	0.96±0.04	Agreement
	1.28±0.09	1.07±0.02	0.84±0.06	Agreement
Copper	3.84±0.04	3.98±0.03	1.04±0.01	Disagreement
	2.60±0.04	2.63±0.01	1.01±0.02	Agreement
	1.33±0.01	1.28±0.01	0.96±0.01	Disagreement
Nickel	3.79±0.07	3.89±0.01	1.03±0.02	Agreement
	2.58±0.13	2.58±0.01	1.0	Agreement
	1.32±0.16	1.26±0.01	0.95±0.11	Agreement
Chromium	3.74±0.28	3.85±0.03	1.03±0.08	Agreement
	2.69±0.05	2.53±0.01	0.94±0.02	Disagreement
	1.20±0.10	1.23±0.01	1.03±0.09	Agreement

## 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.<sup>1</sup>

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)