

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

REGION I

Report No. 50-29/81-07

Docket No. 50-29

License No. DPR-3 Priority -- Category C

Licensee: Yankee Atomic Electric Company

1671 Worcester Road

Framingham, Massachusetts

Facility Name: Yankee Atomic Power Station

Inspection At: Rowe, Massachusetts

Inspection Conducted: April 28-30, 1981

Inspectors: J. C. Jang

J. C. Jang, Radiation Specialist

7-15-81
date

J. J. Kottan
J. J. Kottan, Radiation Laboratory Specialist

7-15-81
date

Approved by: J. J. Kottan
for B. J. Bores, Chief, Independent Measurements
and Environmental Protection Section, EP&PS Branch

date
7-15-81
date

Inspection Summary: Inspection on April 28-30, 1981 (Report No. 50-29/81-07)

Areas Inspected: Routine, unannounced inspection of the licensee's chemical and radiochemical measurements program using NRC:I Mobile Radiological Measurements Laboratory and laboratory assistance provided by DOE Radiological and Environmental Services Laboratory. Areas reviewed included: program for quality control of analytical measurements, audit results, performance on radiological analyses of split actual effluent samples; and effluent control procedures. The inspection involved 52 inspector-hours onsite by two NRC regionally based inspectors.

Results: Of the four areas inspected, no items of noncompliance were identified in three areas, one item of noncompliance was identified in one area. (Severity Level V - Failure to have an approved procedure, Paragraph 5.)

Region I Form 12
(Rev. April 1977)

DETAILS

1. Persons Contacted

H. A. Autio, Plant Superintendent
*N. N. St. Laurent, Assistant Plant Superintendent
*J. L. Staub, Technical Assistant to Plant Superintendent
*W. D. Billings, Chemistry Supervisor
*L. French, PORC Section
*J. Trejo, Health Physics Supervisor
*J. S. Gedutis, Technical Assistant, Chemistry
*M. W. Thisell, Technical Assistant, Chemistry

*denotes those present at exit interview.

2. Laboratory QC Program

The inspector reviewed the licensee's program for the quality control of analytical measurements. The inspector noted that the licensee's procedure AP-9004, Laboratory Quality Assurance Program, covers quality control for both reactor coolant chemistry analyses and radiological analyses of effluent samples. In addition, the operating procedures for the various counting instruments specify daily source checks and yearly calibrations. The inspector noted that Procedure AP-9004 assigns the overall responsibility of the QC program to the Department Supervisor with specific duties assigned to the Technical Assistants. The licensee's effluent radiological analysis QC program consists of yearly splits with the contracted laboratory for comparison analyses.

The inspector also discussed laboratory QC in general and the importance of QC control charts in detail with the licensee.

The inspector had no further questions in this area.

3. Audit Results

The inspector reviewed an audit of the Chemistry Department by Corporate QA personnel (Audit Report No. YR80-02 dated May 12-14, 1980). The inspector had no further questions in this area.

No items of noncompliance were identified.

4. Confirmatory Measurements

During the inspection, actual liquid, airborne particulates and charcoal, and gaseous effluent samples were split between the licensee and NRC: I for the purpose of intercomparison. The effluent samples were analyzed by the licensee using the licensee's normal methods and equipment, and by

the NRC using the NRC:I Mobile Radiological Measurements Laboratory. Joint analyses of actual effluent samples are used to determine the licensee's capability to measure radioactivity in effluent samples. The comparison measurement of a charcoal cartridge for airborne iodine was not made during the inspection. The licensee uses a different charcoal cartridge (diameter 4.3 cm, height 5.5 cm) than the NRC's (diameter 5.5 cm, height 2.5 cm). The inspector stated that the NRC would spike one of the licensee's charcoal cartridge with a radioactive standard and send the spiked charcoal cartridge to the licensee for analysis. The result will be compared with the licensee's result when received at a later date, and will be documented in a subsequent inspection report.

In addition, a liquid effluent sample was sent to the NRC reference laboratory, Department of Energy, Radiological and Environmental Services Laboratory (RESL), for analyses requiring wet chemistry. The analyses to be performed on the samples are: Sr-89, Sr-90, gross alpha, gross beta and tritium. These results will be compared with the licensee's results when received at a later date, and will be documented in a subsequent inspection report.

The results of the sample measurement inter-comparisons indicated that all of the measurements were in agreement or possible agreement under the criteria used for comparing results (see Attachment 1). The results of the comparisons are listed in Table I.

5. Procedures and Records

The inspector reviewed the licensee's procedures for chemical, radio-chemical and effluent analyses. The inspector noted that the licensee sent samples to a contracting laboratory for Sr-89, Sr-90, and C-14 analyses, but the licensee does not have written and PORC approved vendor's procedures for these analyses as per Technical Specifications Section 6.8.2. Section 6.8.1 of the Technical Specifications requires written procedures as per Sections 5.1 and 5.3 of ANSI N18.7-1972 and Appendix "A" of Regulatory Guide 1.33, November 1972. Section 5.3 of ANSI N18.7-1972 and Appendix A of Regulatory Guide 1.33 require chemical and radiochemical control procedures. The inspector stated that the failure to have reviewed and approved procedures for Sr-89, Sr-90, and C-14 were items of noncompliance (29/81-07-01). The inspector had no further questions in this area.

The inspector also reviewed records and procedures in the following areas:

a. Records

- (1) Gaseous discharge release permits (January 1980 to December 1980)
- (2) Liquid discharge release permits (January 1980 to December 1980)

b. Procedures

- (1) AP-9000, Qualification and Training of Chemistry and Health Physics Personnel
- (2) AP-9003, Chemistry Instructions, Reports and Records
- (3) AP-9004, Laboratory Quality Assurance Program
- (4) OP-9220, Determination of Gross Beta Radioactivity
- (5) OP-9240, Tritium Analysis by Liquid Scintillation Counting
- (6) OP-9237, Determination of Gross Gamma Radioactivity
- (7) DP-9229, Crud Concentration and Radionuclide Analysis
- (8) DP-9222, Alpha Emitter Analysis
- (9) DP-9225, Radionuclide Analysis by Gamma Spectroscopy (NaI detector)
- (10) Radionuclide Analysis by Gamma Spectroscopy (Ge(Li) detector)

During the review of DP-9222, Alpha Emitter Analysis, the inspector noted that there is no self absorption correction in the procedure.

Ten-milliliters of an actual Waste Hold Tank sample were taken and evaporated to dryness on a tared 2" stainless steel planchet. The residual weight was 0.3 mg/cm². Section 1.2 of DP-9222 requires 1000-ml of sample for gross alpha analysis. Therefore, the residual weight should be 30 mg/cm² if 1000-ml of sample were evaporated. The inspector calculated the correction factor and the factor was 18. Consequently, the licensee's gross alpha results are lower by a factor of 18. The inspector reviewed the gross alpha release data for 1980 to date and there were no evidences that the licensee would exceed any effluent release limits. However, the inspector stated this would be considered as a follow-up item (29/81-07-02).

The inspector noted that the licensee has used the same counting efficiency (40%) since March, 1979 for gross alpha analyses. However, a review of the licensee's daily counter source check data indicates that the actual efficiency is lower than 40% by approximately several percent. The inspector stated that this would be considered a follow up item (29/81-07-03) pending reevaluation of the alpha counting efficiency by the licensee.

The inspector reviewed the gross alpha release data for 1980 to date and there were no evidences that the licensee would exceed any effluent release limits.

The inspector noted that the licensee passed liquid samples through ion exchange resin and sent the resin to a vendor for Sr-89 and Sr-90 analyses. The licensee assumed all radiostrontium was replaced in the ion exchange resin. The addition of carrier before processing the sample is standard laboratory practice for all analyses.

The inspector discussed in detail the addition of strontium carrier with the licensee and the licensee agreed to add carrier before passing the liquid sample through ion exchange resin.

The inspector stated that this would be considered as a follow-up item (29/81-07-04).

The inspector had no further questions in these areas.

6. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on April 30, 1981. The inspector summarized the purpose and scope of the inspection and the inspector findings.

TABLE 1

<u>SAMPLE</u>	<u>ISOTOPE</u>	<u>NRC VALUE</u>	<u>LICENSEE VALUE</u>	<u>COMPARISON</u>
<u>RESULTS IN TOTAL MICROCURIES</u>				
Particulate Filter 4-28-81 10:25	Cr-51	(2.09±0.14)E-3	(1.82±0.09)E-3	Agreement
	Fe-59	(7.9±0.7)E-4	(7.2±0.5)E-4	Agreement
	Co-58	(1.88±0.04)E-3	(1.86±0.05)E-3	Agreement
	Zr-95	(5.3±0.3)E-4	(4.6±0.3)E-4	Agreement
	Mn-54	(1.17±0.04)E-3	(1.11±0.04)E-3	Agreement
	Co-60	(1.59±0.05)E-3	(1.66±0.05)E-3	Agreement
	Nb-95	(7.6±0.3)E-4	(7.5±0.3)E-4	Agreement
	Ru-103	(1.5±0.2)E-4	(1.78±0.12)E-4	Agreement
	I-131	(1.05±0.03)E-3	(9.8±0.3)E-4	Agreement
	Cs-134	(1.5±0.2)E-4	(1.58±0.14)E-4	Agreement
	Ba-140	(1.39±0.10)E-3	(9.2±0.6)E-4	Agreement
	Ce-141	(1.93±0.14)E-3	(1.72±0.08)E-3	Agreement
	Ce-144	(7.5±0.6)E-4	(7.2±0.4)E-4	Agreement
Cs-137	(2.6±0.3)E-4	(2.5±0.2)E-4	Agreement	
Waste Hold Tank 4-28-81 10:25	Cr-51	(1.08±0.15)E-4	(1.1±0.2)E-4	Agreement
	Mn-54	(9.8±0.2)E-5	(9.8±1.1)E-5	Agreement
	Co-58	(8.6±0.2)E-5	(9.1±1.0)E-5	Agreement
	Fe-59	(2.7±0.3)E-5	(2.0±0.7)E-5	Agreement
	Co-60	(8.8±0.2)E-5	(9.2±1.1)E-5	Agreement
	Zr-95	(2.1±0.2)E-5	(2.7±0.7)E-5	Agreement
	Nb-95	(3.14±0.16)E-5	(3.2±0.6)E-5	Agreement
	I-131	(9±2)E-6	(9±2)E-6	Agreement
	Cs-134	(4.76±0.05)E-4	(4.6±0.2)E-4	Agreement
	Cs-137	(7.57±0.06)E-4	(7.8±0.3)E-4	Agreement
Ce-144	(3.5±0.8)E-5	(3.6±0.8)E-5	Agreement	
Reactor Coolant 4-26-81 08:30	I-131	(2.84±0.02)E-2	(2.9±0.2)E-2	Agreement
	I-132	(.29±0.02)E-1	(2.4±0.2)E-1	Agreement
	I-133	(1.975±0.006)E-1	1.66±0.06)E-1	Possible Agreement
	I-134	(3.37±0.11)E-1	3.6±0.5)E-1	Agreement
	I-135	(3.07±0.03)E-1	(2.5±0.2)E-1	Agreement
	Co-58	(6.5±0.2)E-3	(5±1)E-3	Agreement
	Na-24	(2.6±0.2)E-3	(2.8±1.2)E-3	Agreement
Waste Gas 4-28-81 15:20	Xe-133	(1.66±0.05)E-4	(1.32±2%)E-4	Agreement
	Kr-85	(8.1±0.6)E-3	(5.74±6%)E-3	Agreement

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 judgement limits are variable in relation to the comparison of the NRC Reference Laboratory's value to its associated 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 must be considered acceptable as the resolution decreases.

<u>Resolution</u>	<u>Agreement</u>	RATIO= $\frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$	
		<u>Possible Agreement A</u>	<u>Possible Agreement B</u>
<3	0.4 - 2.5	0.3 - 3.0	No Comparison
4 - 7	0.5 - 2.0	0.4 - 2.5	0.3 - 3.0
8 - 15	0.6 - 1.66	0.5 - 2.0	0.4 - 2.5
16 - 50	0.75 - 1.33	0.6 - 1.66	0.5 - 2.0
51 - 200	0.80 - 1.25	0.75 - 1.33	0.6 - 1.66
>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.

Iodine on absorbers

"B" criteria are applied to the following analyses:

Gamma Spectrometry where principal gamma energy used for identification is less than 250 Kev.

89Sr and 90Sr Determinations.

Gross Beta where samples are counted on the same date using the same reference nuclide.