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

Region I

Report No. 50-334/82-31

Docket No. 50-334

License No. DPR-66 Priority -- Category C

Licensee: Duquesne Light Company

435 Sixth Avenue

Pittsburgh, Pennsylvania 15219

Facility Name: Beaver Valley Power Station, Unit 1

Inspection at: Shippingport, Pennsylvania

Inspection conducted: December 14-17, 1982

Inspectors: J. C. Jang 1-12-83
J. C. Jang, Radiation Specialist date

Approved by: J. J. Kottan 1-12-83
J. J. Kottan, Acting Chief, Effluents Radiation Protection Section, Radiological Protection Branch date

Inspection Summary: Inspection December 14 - 17, 1982 (Report No. 50-334/82-31)
Area 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 Service 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 36 inspector-hours onsite by one NRC regionally based inspector.
Results: Of the four areas inspected, no items of noncompliance were identified in areas.

DETAILS

1. Individuals Contacted

Principal Licensee Employees

J. Clark, Radiation Control Foreman
W. Lacey, Plant Superintendent
*V. Linnenbom, Radiochemical Analysis Coordinator
*F. Lipchick, Senior Compliance Engineer
A. Mizia, Senior QA Engineer
E. Schnell, Radiation Control Supervisor
*J. Wenkhous, Reactor Control Chemist

The inspector also interviewed other licensee employees, including members of the chemistry and health physics staffs.

*Denotes those present at exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Follow-up Item (334/81-22-01): Efficiency calibration on the SAM-2 Single Channel Analyzer. The inspector reviewed and verified the the implementation of Procedure RIP 5.13; SAM-2/RD-22, I-131 Counting System". The efficiency calibration was performed as required.

(Closed) Noncompliance (334/81-22-02): Failure to follow gas sampling procedure (RM 6.6). The inspector verified the corrective actions regarding the waste gas sampling. A technician called the control room to obtain the waste gas decay tank pressure as required by Procedure RM 6.6.

3. Laboratory QC Program

The inspector reviewed the licensee's program for the quality control of analytical measurements. The inspector noted that the licensee's BVPS-CM Chapter 9, Conduct of Operation, Part C covers quality control for both reactor coolant chemistry analyses and radiological analyses of effluent samples. The licensee's effluent radiological analyses QC program consists of inter-laboratory comparisons. The licensee participates in the EPA cross check program as a part of the laboratory QC program. Also, the operating procedures for the various counting instruments specify daily background and source checks and where applicable, gain checks. The inspector discussed Regulatory Guide 4.15, Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment, and laboratory quality control in this general area with the licensee. The inspector had no further questions in this area.

No items of noncompliance were identified.

4. Audit Results

The inspector determined that the licensee's chemistry and effluent monitoring programs were on the Quality Assurance Division audit list. The inspector reviewed Audit No. BV-1-82-07 dated February 25-26, 1982. The inspector had no further questions in this area.

No items of noncompliance were identified.

5. Confirmatory Measurements

During the inspection, actual liquid, airborne particulates and charcoal and gaseous efflucent 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.

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. The results when received at a later date will be documented in a subsequent inspection report. During a previous inspection (August 1981) the licensee sent a liquid effluent sample to RESL for Sr-89, Sr-90, gross alpha, gross beta, and tritium comparisons but the sample was lost. Therefore, comparisons were not made during this inspection.

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

The inspector determined from discussions with the licensee that iodine activity in charcoal is routinely determined by counting only the inlet side of the charcoal cartridge and using a homogeneous geometry. The licensee counted both sides of the charcoal cartridge during this inspection and averaged the results. The licensee determined that the iodine was collected on the surface of charcoal cartridge. The inspector noted that the measurement of the iodine activity on the charcoal cartridge would be in a conservative direction using a homogeneous geometry and would not have resulted in the licensee exceeding any effluent release limits. However, the licensee stated that this area would be examined and appropriate action would be taken. The inspector stated that this item would be reviewed during a subsequent inspection (50-334/82-31-01).

6. Records and Procedures

The inspector reviewed daily background and source check log books of counting instruments for 1982. These instruments were the liquid scintillation counter, gas-flow proportional counter, Ge(Li) detector system, NaI well detector, and SAM-2. The inspector had no further questions in this area.

The inspector reviewed BVPS-CM Chapter 5, Radiochemistry Procedures, "Iodine", and Chapter 6, Part 3, Chemical Solution, Solution No. 211, "Iodine". The inspector noted that the licensee had been using a radiochemical speparation method for iodine analyses in the reactor coolant water to meet Section 3.4.8 of the Technical Specifications requirement for iodine concentration in reactor coolant. The inspector noted that the iodine carrier solution (Solution No. 211) was yellowish instead of colorless. The inspector stated that the reducing agent ($NaHSO_3$) did not to keep the iodide form (I^-) in the carrier solution. Therefore, iodine chemical yields were decreased due to the low iodide concentration in the carrier solution and resulted in higher iodine activities in reactor coolant samples. The inspector noted that the determination of I-131 dose equivalent in a reactor coolant sample would be in a conservative direction and would not exceed the Technical Specifications requirement. The licensee made a new iodine carrier solution during this inspection. The licensee stated that the iodine carrier solution would be examined frequently, and the procedure would be changed if necessary. The inspector stated that this item will be reviewed during a subsequent inspection (50-334/82-31-02).

The reactor coolant sample split during this inspection was counted directly by the licensee using a gamma spectrometry method and the result was in agreement as listed in Table 1.

7. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on December 17, 1982. The inspector summarized the purpose and scope of the inspection and the inspector findings.

The licensee agreed to perform the analyses listed in Paragraph 5 and report the results to the NRC.

TABLE 1

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER MILLILITER		
Reactor Coolant 12-14-82 1038 hr	I-131	(9.0 ± 0.2) E-3	(1.1 ± 0.3) E-2	Agreement
	I-133	(2.00 ± 0.04) E-2	(2.66 ± 0.06) E-2	Agreement
	I-135	(3.3 ± 0.4) E-2	(3.5 ± 0.2) E-2	Agreement
	Co-60	(1.4 ± 0.2) E-6	(1.02 ± 0.12) E-6	Agreement
Liquid Radwaste LW-TK-5B 12-14-82 1400 hr	I-131	(3.0 ± 0.8) E-7	(3.9 ± 1.0) E-7	Agreement
	Cs-137	(3.4 ± 0.9) E-7	(5.1 ± 0.7) E-7	Agreement
Waste Gas GW-TK-1B 12-15-82 0940 hr	Xe-131m	(4.3 ± 0.6) E-3	(3.8 ± 0.3) E-3	Agreement
	Xe-133	(8.26 ± 0.05) E-2	(1.032 ± 0.003) E-1	Agreement

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER SAMPLE		
Charcoal 12-15-82 0025 hr	I-131	(1.13 ± 0.12) E-4	(1.3 ± 0.2) E-4	Agreement
Particulate filter 12-15-82 0025 hr	Co-60	(1.90 ± 0.14) E-4	(1.5 ± 0.2) E-4	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 it associated uncertainty. As that radio, 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.

RATIO= $\frac{\text{LICENSEE VALUE}}{\text{NRC REFERENCE VALUE}}$

Resolution	Agreement	Possible Agreement A	Possible Agreement B
‘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 applid 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 adsorbers

"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.