U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-334/88-13
50-412/88-08

Docket No. 50-334
50-412

License No. DPR-66
NPF-73

Category C

Licensee: Duquesne Light Company
Post Office Box 4
Shippingport, Pennsylvania 15077

Facility Name: Beaver Valley Power Stations, Units 1 and 2

Inspection At: Shippingport, Pennsylvania

Inspection Conducted: April 11-15, 1988

Inspectors: J. J. Kirkwood for A. Kirkwood, Radiation Specialist — 5-13-88 date

Approved by: W. J. Pasciak — 5/16/88 date
W. J. Pasciak, Chief
Effluents Radiation Protection Section

Inspection Summary: Inspection on April 11-15, 1988 (Inspection Report Nos. 50-334/88-13 and 50-412/88-08

Areas Inspected: Routine, unannounced inspection of the licensee's radiological measurements program using the NRC: I Mobile Radiological Measurements Laboratory and laboratory assistance provided by DOE's Radiological and Environmental Sciences Laboratory. Areas reviewed included: previously identified items, confirmatory measurements, audits, laboratory QA/QC, sampling and procedures, and management/organization.

Results: No violations were identified.

Details

1.0 Individuals Contacted

Principle Licensee Employees

* J. Sieber, Vice President, Nuclear Group(DLCo)
* T. Noonan, Plant Manager
* J. Kosmal, Manager, Radiological Control(DLCo)
* V. Linnenbom, Director, Plant Chemistry
* D. Hunkele, Director, Quality Assurance, Operations
* D. Girdwood, Director, Radiation Operations, Unit 1
  W. Wirth, Director, Effluent Control & Environmental Monitoring
* F. Liptak, Count Room Coordinator
* R. Freund, Sr. Health Physics Specialist
* J. Breslin, Health Physics Specialist
  A. Lonnett, Sr. Health Physics Specialist
* B. Sepelak, Licensing Engineer

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

* Denotes those present at the exit interview.

2.0 Previously Identified Item

(Open) Unresolved Item (50-334/87-07-03)

This item was opened as a result of two similar events occurring within a few days of each other and identified by the licensee in LER's 87-009 and 87-011. They both had root causes related to chemistry personnel sampling errors. An administrative concern addressed in the item has been adequately resolved through changes to BVPS-1/BVPS-2, Chemistry Manual, Chapter 3, Issue 1, Rev. 1, Sampling and Testing, Section 3, VCT-Vapor Space Grab Sample, as well as mention of the above LER's in Chemistry Training Module 4135, Advanced Systems Chemistry. A second concern, relating to possible engineering changes(routing the sampling lines back to the source), has not yet been evaluated by the Engineering Department. Chemistry has done a preliminary assessment and this does not seem a viable option. Chemistry is also trying to determine if these samples can be eliminated.

3.0 Confirmatory Measurements

3.1 Split Sample Results

During this part of the inspection, liquid, particulate filter, charcoal cartridge, and gas samples were split between the licensee and NRC for the purpose of intercomparison. Where possible the split samples are

actual effluent samples or inplant samples which duplicate counting geometries used by the licensee for effluent sample analyses. The samples were analyzed by the licensee using normal methods and equipment, and by the NRC:I Mobile Radiological Measurements Laboratory. Joint analyses of actual effluent samples are used to verify the licensee's capability to measure radioactivity in effluent samples with respect to Technical Specification and other regulatory requirements.

In addition, a liquid effluent sample was sent to the NRC reference laboratory, Department of Energy, Radiological and Environmental Sciences Laboratory(RESL), for analyses requiring wet chemistry. The analyses to be performed on the sample are Sr-89, Sr-90, Fe-55, gross alpha, and tritium. The results will be compared with the licensee's results at a later date and will be documented in a subsequent inspection report.

The results of an effluent sample split between the licensee and the NRC:I, during a previous inspection on October 1-5, 1984(Inspection Report No. 50-334/84-24), were also compared during this inspection.

The results of the sample measurements comparison indicated that all of the measurements were in agreement under the criteria used for comparing results. (See attachment). The results of the comparison are listed in Table 1. The licensee informed the inspector before the split of the gas sample that the Ar-41 energy line could not be reasonably compared as the licensee's gas calibration standard had a maximum energy of 514 keV, whereas, the energy of Ar-41 is greater than 1000 keV. The inspector informed the licensee that gas calibration standards are available which cover energies up to 1836 keV. The licensee stated that they would investigate the purchase of one of these standards.

3.2 Quality Assurance of Radioanalytic Measurements

The inspector performed a selected review of the licensee's program for the quality assurance of radioanalytic measurements. The review was performed with respect to criteria contained in the following:

* Regulatory Guide 4.15, "Quality Assurance For Radiation Monitoring Programs(Normal Operations)-Effluent Streams & The Environment"

* Principles of Quality Assurance of Chemical Measurements (National Bureau of Standards)

Procedures selectively reviewed included:

* BVPS-Chemistry Manual, Administrative Directives, Part 4-Laboratory Control Program, Issue 5, Rev. 0

* BVPS-1/BVPS-2, Chemistry Manual, Administrative Controls, C.M.O.9, Laboratory Quality Control Program, Issue 1, Rev. 1

* BVPS-1/BVPS-2, Chemical Measurements, Chapter 5, Radiochemical Procedures, C.M.5.13, Operational Counter Verification Data Procedure

The inspector also reviewed the following quality control data and records:

* Radcon Quality Control Logbook(Det. 1025) for the period April 1-13, 1988

* Quality Control Logbook for Packard LSA 2000 CA/LL, liquid scintillation counter for the period April 1-13, 1988

Within the scope of this review, the following observations and concerns were identified:

* The inspector observed the off-shift, daily instrument quality control checks being performed by the chemistry analyst. A daily standard and background check; a weekly energy calibration; and a yearly efficiency calibration is done on the gamma spectroscopy systems. A daily standard and background check and at least a yearly quench curve is done for the liquid scintillation counter. The staff member performed these functions adequately. When questioned about instrument control chart limits, the analyst demonstrated that he had a good understanding for the statistical basis for these limits and the actions to take if they were exceeded. When asked a question that he didn't readily know the answer, he referred to the appropriate procedure.

* The inspector also reviewed records and data. Entries in the quality control logbooks were adequately maintained. Out-of-limits plots on the control charts were addressed by corrective actions in a timely fashion. One area of concern was highlighted by an entry on the gamma spectroscopy quality control logbook for Unit 1. The system was down April 3, 1988, all day. The explanation was that the countroom coordinator could not be reached. When asked about an alternate, the analyst could not readily name someone who could handle the problem. The licensee stated that this problem is overcome by good vendor service and the training of a health physics specialist to assume these duties if the countroom coordinator is not available.

* While reviewing the Administrative Controls section of the Chemistry Manual, the outline of the Laboratory Quality Control Program, C.M.O.9, mentioned an Intralab and Interlab quality control program. Analysis of blind samples, prepared both in-house

for intralab comparisons and blind samples prepared outside, for independent quality control checks, were mentioned. Chemistry is not currently utilizing these techniques in its program. The licensee stated that they are including these items in the reissue of C.M.O.9, Chapter 9, of the Chemistry Manual. The licensee is consolidating and expanding its laboratory quality assurance program under this issue. The improvements to the quality control program will be followed up on a subsequent inspection(334/88-13-01 & 412/88-08-01).

3.3 Sampling

The inspector reviewed the following procedures with respect to the observation of a sample drawn from a liquid waste tank:

* BVPS-1/BVPS-2, Chemistry Manual 1-3.18, Chapter 3, Sampling & Testing Unit 1, Issue 1, Rev. 0

* BVPS-R.C.M., Units 1 & 2, Chapter 3, Radcon Procedure 6.1, Liquid Waste Holdup Tank Sampling, Issue 2

A radiation control technician sampled an evaporator test tank, LW-TK-5B, in order to obtain a liquid waste sample for analyses. The method used was in conformance with the procedures reviewed.

3.4 Audits

The inspector reviewed the following audits:

* BV-1-87-25, Unit No.1, Chemistry, with audit dates of July 1-12, 1987

* BV-1-87-39, Unit No.1, Chemistry, dated November 9-25, 1987

* BV-C-88-07, BVPS Unit Nos. 1 & 2, Chemistry(Administrative Controls), dated March 14-18, 1988

Areas audited included procedures and training, Technical Specification compliance, laboratory quality assurance program and administrative controls. The audits are in checklist format and appear to be thorough and technically adequate. The results of all the audits found that chemistry was performing satisfactorily. One concern the inspector noted after reviewing all the audits, was that no mention is made of the status of previous audit findings in subsequent audit reports.

4.0 Management Controls

The inspector reviewed organizational charts, interviewed supervisory and technical personnel and made observations regarding operation of the chemistry department. Lines of authority appear clearly defined as outlined on the organizational charts and were understood by those interviewed. Supervisory personnel were aware of the chain of command and did not express any difficulty of access to their supervisors. Staffing appears adequate under the current workload, but, based on a conversation with the Court Room Coordinator, additional staff should be considered in order to expeditiously handle an expanded quality control program for radioanalytical measurements. Management material resource support is evidenced by recent chemistry acquisitions of state-of-the-art gamma spectroscopy and liquid scintillation counting systems.

5.0 Exit Interview

The inspector met with the licensee's representatives (denoted in section 1.0) at the conclusion of the inspection on April 15, 1988, and summarized the scope and findings of the inspection.

TABLE 1

BEAVER VALLEY VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	RESULTS IN TOTAL MICROCURIES		COMPARISON
		NRC VALUE	LICENSEE VALUE	
Particulate Filter 0835 hrs. 4-12-88 Unit 1 Detector	I-131	(1.55±0.12) E-3	(1.6±0.2) E-3	Agreement
	I-133	(5.7±0.3) E-3	(5.5±0.2) E-3	Agreement
	Co-58	(8.1±1.2) E-4	(1.2±0.2) E-3	Agreement
Unit 2 Detector	I-131	(1.55±0.12) E-3	(1.8±0.2) E-3	Agreement
	I-133	(5.7±0.3) E-3	(5.8±0.2) E-3	Agreement
	Co-58	(8.1±1.2) E-4	(1.04±0.13) E-3	Agreement
Charcoal Cartridge (Containment) 1440 hrs. 4-13-88 Unit 1 Detector	I-131	(6.1±0.3) E-3	(6.2±0.3) E-3	Agreement
	I-133	(3.6±0.4) E-3	(3.2±0.2) E-3	Agreement
Unit 2 Detector	I-131	(6.1±0.3) E-3	(6.3±0.2) E-3	Agreement
	I-133	(3.6±0.4) E-3	(3.6±0.2) E-3	Agreement
Charcoal Cartridge 4-11-88 0830 hrs. Unit 2 Detector	I-131	(2.5±0.4) E-4	(2.5±0.3) E-4	Agreement
Unit 1 Detector	I-131	(2.5±0.4) E-4	(2.2±0.3) E-4	Agreement
		RESULTS IN MICROCURIES/ml		
Liquid Waste LW-TK-5B 1130 hrs. 4-13-88 Unit 1 Detector	Co-58	(1.36±0.03) E-5	(1.30±0.04) E-5	Agreement
	Co-60	(1.35±0.04) E-5	(1.23±0.05) E-5	Agreement
	Ag-110m	(2.2±0.2) E-6	(2.1±0.3) E-6	Agreement
	Sb-125	(3.6±0.5) E-6	(3.0±0.5) E-6	Agreement
	Sr-92	(1.1±0.2) E-6	(9.2±1.4) E-7	Agreement
Liquid Waste LW-TK-5B 1130 hrs. 4-13-88 Unit 2 Detector	Co-58	(1.36±0.03) E-5	(1.40±0.04) E-5	Agreement
	Co-60	(1.35±0.04) E-5	(1.24±0.04) E-5	Agreement
	Ag-110m	(2.2±0.2) E-6	(2.2±0.3) E-6	Agreement
	Sb-125	(3.6±0.5) E-6	(3.1±1.0) E-6	Agreement
	Sr-92	(1.1±0.2) E-6	(1.2±0.2) E-6	Agreement

TABLE 1

BEAVER VALLEY VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	RESULTS IN MICROCURIES/ml		COMPARISON
		NRC VALUE	LICENSEE VALUE	
RCS 2ml 1301 hrs.	Co-60	(1.7±0.2) E-4	(2.5±0.2) E-4	Agreement
4-13-88 (24 hr. Count)	W-187	(5.6±0.9) E-4	(5.9±0.7) E-4	Agreement
Unit 1	I-131	(1.43±0.03) E-3	(1.28±0.02) E-3	Agreement
	I-133	(4.88±0.08) E-3	(4.76±0.06) E-3	Agreement
	Cs-134	(1.4±0.2) E-4	(1.6±0.1) E-4	Agreement
	I-135	(9±1) E-3	(7±1) E-3	Agreement
	Cs-137	(1.4±0.2) E-4	(1.7±0.1) E-4	Agreement
	Na-24	(4.2±0.7) E-4	(5.3±0.5) E-4	Agreement
Liquid Waste Tank	H-3	(1.77±0.01) E-2	(1.50±7) E-2	Agreement
1200 hrs. 10-2-84	Gross Alpha	(5±2) E-9	No Comparison*	---
	Gross Beta	(3.41±0.13) E-6	No Comparison**	---
	Fe-55	(1.2±0.5) E-7	No Comparison*	---
RCS 2ml 1301 hrs.	I-131	(1.41±0.07) E-3	(1.3±0.1) E-3	Agreement
4-13-88 Unit 1,	I-133	(4.87±0.09) E-3	(4.3±0.1) E-3	Agreement
Detector				
Unit 2, Detector	I-131	(1.41±0.07) E-3	(1.55±0.11) E-3	Agreement
	I-133	(4.87±0.09) E-3	(4.89±0.08) E-3	Agreement
RCS 2ml 1301 hrs.	Co-60	(1.7±0.2) E-4	(2.31±0.12) E-4	Agreement
4-13-88	W-187	(5.6±0.9) E-4	(5.1±0.6) E-4	Agreement
(24 hour Count)	I-131	(1.43±0.03) E-3	(1.41±0.02) E-3	Agreement
Unit 2, 2 Sigma Error	I-133	(4.88±0.08) E-3	(5.05±0.06) E-3	Agreement
	Cs-134	(1.4±0.2) E-4	(1.5±0.1) E-4	Agreement
	I-135	(8.9±1) E-3	(8.2±0.4) E-3	Agreement
	Cs-137	(1.4±0.2) E-4	(1.7±0.1) E-4	Agreement
	Na-24	(4.2±0.7) E-4	(4.7±0.3) E-4	Agreement
RCS 2ml 1615 hrs.,	Co-58	(3.6±0.4) E-4	(3.3±0.2) E-4	Agreement
4-14-88 Unit 1				

*Less than LLD
**Licensee does not normally analyze

TABLE 1

BEAVER VALLEY VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	RESULTS IN MICROCURIES/cc		COMPARISON
		NRC VALUE	LICENSEE VALUE	
Strip Gas 2.726 cc 1050 hrs.	Ar-41	(2.37±0.04) E-4	Not Calibrated at this energy	---
4-14-88 Unit 1 Detector	Kr-85m	(1.28±0.06) E-3	(1.27±0.11) E-3	Agreement
	Xe-133	(4.35±0.09) E-3	(4.2±0.2) E-3	Agreement
	Xe-135	(8.15±0.10) E-3	(7.4±0.2) E-3	Agreement
Unit 2 Detector	Kr-85m	(1.28±0.06) E-3	(1.17±0.07) E-3	Agreement
	Xe-133	(4.35±0.09) E-3	(4.53±0.23) E-3	Agreement
	Xe-135	(8.15±0.10) E-3	(7.43±0.13) 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.

Resolution[1]	Ratio For Agreement[2]
<3	No comparison
4 - 7	0.5 - 2.0
8 - 15	0.6 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
>200	0.85 - 1.18

[1]Resolution = (NRC Reference Value/Reference Value Uncertainty)

[2]Ratio = (License Value/NRC Reference Value)