U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-277/85-09
50-278/85-09

Docket No. 50-277
50-278

License No. DPR-44 and DPR-56 Priority -- Category C

Licensee: Philadelphia Electric Company

2301 Market Street

Philadelphia, Pennsylvania 19101

Facility Name: Peach Bottom Atomic Power Station, Units 2 and 3

Inspection At: Delta, Pennsylvania

Inspection Conducted: January 28 - February 1, 1985

Inspectors: J. J. Kottan — 3-5-85
J. J. Kottan, Radiation Laboratory Specialist — date

R. Struckmeyer — 3-6-85
R. Struckmeyer, Radiation Specialist — date

Approved by: W. J. Pasciak — 3-8-85
W. J. Pasciak, Chief, BWR Radiation Safety Section — date

Inspection Summary:

Inspection on January 28 - February 1, 1985 (Combined Report No. 50-277/85-09, 50-278/85-09)

Areas Inspected: Routine, unannounced inspection of the licensee's effluent control program and radiochemical measurements program using the NRC:I Mobile Radiological Measurements Laboratory and laboratory assistance provided by DOE Radiological and Environmental Sciences Laboratory. Areas reviewed included: program for the quality control of analytical measurements, performance on radiological analyses of split actual effluent samples, and effluent records and procedures. The inspection involved 78 inspector hours onsite by two NRC region-based inspectors.

Results: Of the areas inspected, no violations were identified.

DETAILS

1.0 Individuals Contacted

Principal Licensee Employees

*R. Fleishmann, Station Superintendent
*D. Oltmans, Senior Chemist
*W. Knapp, Director, Radiation Protection (Corporate Office)
H. Watson, Plant Chemist
J. Valinski, Senior TA
G. Barley, Assistant Plant Chemist

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

*Denotes those present at the exit interview.

2.0 Laboratory QC Program

The inspector reviewed the licensee's program for the quality control of analytical measurements. The inter-laboratory QC program consists of quarterly sample splits with an outside laboratory for analyses required of effluent samples by Technical Specifications. Also, the operating procedures for the various counting instruments specify daily background and source checks and where applicable, gain checks. The inspector reviewed selected QC data for 1984. The inspector noted that the licensee operated a gas flow proportional counter which was out of the QC control chart control limit. In addition, the inspector noted that the licensee did not maintain a control chart for the liquid scintillation counter. A review of the licensee's tritium inter-laboratory checks indicated that the results for the fourth quarter of 1984 were in agreement, but the results for the third quarter of 1984 were not in agreement and the results of a sample split during a previous inspection with the NRC in January, 1981 were in disagreement. The licensee stated that a new LSC was being purchased, and subsequent to the purchase a new QC program would be implemented for the LSC. The inspector noted that the gas flow proportional counters are not used for Technical Specification required effluent analyses, but the LSC is used for Technical Specification required analyses. The licensee stated that until the purchase of the LSC and implementation of a QC program, effluent tritium analyses would be performed by a vendor laboratory. The inspector stated that this area will be reviewed during a subsequent inspection (277/85-09-01, 278/85-09-01).

The inspector had no further questions in this area. No violations were identified.

3. Confirmatory Measurements

During the inspection, liquid, particulate filter, charcoal cartridge, and gas samples were split between the licensee and NRC for the purpose

of intercomparison. The split samples are actual effluent and inplant samples normally analyzed by the licensee. 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 requirements 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, gross alpha, Fe-55 and tritium. The 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 an effluent sample split between the licensee and NRC:I during a previous inspection on January 12-15, 1981, (Inspection Report 50-277/81-01, 50-278/81-01) were also compared during this inspection. Only the tritium results were compared. The licensee could not retrieve the strontium and gross alpha results.

The results of the sample measurements comparison indicated that all of the measurements, with the exception of the tritium, were in agreement under the criteria used for comparing results. (See Attachment I.) The results of the comparisons are listed in Table I. The comparison of the licensee's first count of the offgas sample resulted in four of the results being in disagreement. A recount of the same sample after approximately three hours decay resulted in all of the measurements being in agreement. The inspector noted that the licensee did not appear to be using the gamma spectrometer in a manner which would maximize the system resolution. When a sample, such as a fresh offgas sample, with many photopeaks is analyzed, the system cannot resolve the gamma ray spectrum. However, in samples without interfering photopeaks, such as the decayed offgas sample in which the interfering photopeaks had decayed away, system resolution appears to be adequate. The inspector discussed this area with the licensee. The licensee stated that this area would be reviewed and consideration would be given to using 4096 channels, instead of 2048, and a gain of 0.5 keV per channel. The inspector stated that this area would be reviewed during a subsequent inspection (277/85-09-02, 278/85-09-02).

The tritium results of the sample sent to RESL during this inspection will be compared as soon as received in order to resolve the tritium disagreement (277/85-09-03, 278/85-09-03).

The inspector had no further questions in this area. No violations were identified.

4. Effluent Records and Procedures

The inspector reviewed the licensee's procedures and records in the areas of radiochemistry and effluent control, for the purpose of determining compliance with Technical Specifications. The inspector also reviewed the licensee's implementation of its new Radiological Effluent Technical Specifications (RETS), which went into effect on December 31, 1984. The licensee is collecting and analyzing all samples required by the RETS and is continuing to perform some analyses (e.g. gross beta analyses of liquid effluents) that are no longer required. The licensee's procedures appear to be adequate to implement the sample collections and analyses required by the new RETS.

The inspector reviewed selected liquid and gaseous effluent release permits for 1984 as well as associated procedures. The inspector determined that the licensee's procedural requirements are being followed, and that no Technical Specification limits for gaseous or liquid effluents were exceeded. The licensee uses computer codes (one for gaseous releases, another for liquid) that calculate offsite doses for a given release, and then determine the cumulative monthly fraction (or percent) of both the station administrative limit and the Technical Specifications limit, thus providing a method to suspend releases in the event that a limit may be exceeded. The licensee stated that the determination of sample activity includes a step external to the computer code to correct the activity back to the time at which the sample was taken. The inspector's review of the code (PB.ALPHA) for gaseous releases revealed that the decay correction is made within the code; therefore, the correction was being made twice. This resulted in overestimates of the radioactivity in the releases. The inspector discussed with the licensee its method of code verification. The licensee stated that the code for liquid releases (PB.RADDOS) was verified by the Health Physics group in the PECO corporate office, but that PB.ALPHA was not similarly verified.

The inspector stated that the licensee's program for verification of computer codes related to liquid and gaseous effluents would be reviewed in a future inspection (277/85-09-04; 278/85-09-04).

The inspector examined the effluent monitor readouts in the control room, and noted that they were operational and on-scale. Using the data obtained by analyses of effluent stream samples taken by the licensee and split with the NRC, the inspector verified that the control room readouts were correctly indicating release rates from these effluent streams. The inspector also reviewed selected procedures and records of effluent monitor calibrations for 1984 and 1983. These calibrations appeared to meet the licensee's Technical Specification requirements.

The inspector had no further questions in this area.

No violations were identified.

5. Exit Interview

The inspector met with the licensee representatives denoted in Paragraph 1 at the conclusion of the inspection on February 1, 1985. The inspector summarized the purpose and scope of the inspection and the inspector findings.

The licensee agreed to perform the analyses listed in Paragraph 3 and report the results to the NRC.

TABLE 1

PEACH BOTTOM 2 AND 3 VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER MILLILITER		
FDST 2020 hrs. 1-28-85	Co-60	(1.08 ± 0.03)E-5	(1.19 ± 3.5%)E-5	Agreement
	Zn-65	(2.10 ± 0.08)E-5	(2.08 ± 4.2%)E-5	Agreement
	I-131	(8.4 ± 0.3)E-6	(8.61 ± 3.8%)E-6	Agreement
	I-133	(4.2 ± 0.6)E-6	(4.53 ± 9%)E-6	Agreement
	Cs-134	(6.6 ± 0.4)E-6	(5.92 ± 4.5%)E-6	Agreement
	CS-137	(8.0 ± 0.4)E-6	(7.8 ± 4.6%)E-6	Agreement
FDST 1350 hrs 1-13-81	H-3	(2.22 ± 0.02)E-3	(7.10 ± ?)E-4	Disagreement
Unit 3 Offgas Holdup Pipe 1421 hrs 1-30-85	Kr-85m	(1.4 ± 0.3)E-4	(1.34 ± 11.4%)E-4	Agreement
	Xe-133	(1.782 ± 0.005)E-1	(1.567 ± 0.2%)E-1	Agreement
	Xe-135	(1.308 ± 0.011)E-2	(1.120 ± 0.5%)E-2	Agreement
	Xe-133m	(5.0 ± 0.2)E-3	(4.28 ± 4.1%)E-3	Agreement

TABLE 1

PEACH BOTTOM 2 AND 3 VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER MILLILITER		
Reactor Water	Co-60	(2.6 ± 0.3)E-4	(4.2 ± 23%)E-4	Agreement
0810 hrs	Cu-64	(2.3 ± 0.2)E-1	(2.2 ± 11.2%)E-1	Agreement
1-29-85	Zn-65	(.2 ± 0.2)E-3	(3.4 ± 8.7%)E-3	Agreement
	Sr-92	(1.8 ± 0.2)E-3	(1.8 ± 14%)E-3	Agreement
	I-131	(6.53 ± 0.14)E-3	(6.44 ± 3.7%)E-3	Agreement
	I-132	(4.54 ± 0.05)E-2	(4.34 ± 1.3%)E-2	Agreement
	I-133	(2.09 ± 0.02)E-2	(2.14 ± 1.9%)E-2	Agreement
	I-134	(2.58 ± 0.15)E-2	(3.168 ± 7.5%)E-2	Agreement
	I-135	(2.84 ± 0.06)E-2	(2.535 ± 3.0%)E-2	Agreement
Reactor Water				
0810 hrs	I-131	(5.18 ± 0.09)E-3	(5.52 ± 1.5%)E-3	Agreement
1-29-85	I-132	(4.03 ± 0.04)E-2	(3.49 ± 0.6%)E-2	Agreement
Radiochemical	I-133	(2.08 ± 0.02)E-2	(1.94 ± 0.6%)E-2	Agreement
Separation for	I-134	(2.4 ± 0.2)E-2	(2.38 ± 2%)E-2	Agreement
Iodine	I-135	(2.40 ± 0.06)E-2	(1.85 ± 1.9%)E-2	Agreement

TABLE 1

PEACH BOTTOM 2 AND 3 VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER MILLILITER		
Offgas 0784 hrs 1-30-85 (1st Count)	Kr-85m	(2.90 ± 0.02)E-2	(2.311 ± 0.5%)E-2	Agreement
	Kr-87	(6.89 ± 0.06)E-2	(6.046 ± 0.5%)E-2	Agreement
	Kr-88	(6.80 ± 0.06)E-2	(5.243 ± 0.5%)E-2	Disagreement
	Xe-133	(4.14 ± 0.03)E-2	(3.149 ± 0.6%)E-2	Disagreement
	Xe-135	(1.294 ± 0.004)E-1	(1.032 ± 0.2%)E-1	Disagreement
	Xe-138	(2.98 ± 0.11)E-1	(2.164 ± 1.5%)E-1	Disagreement
Offgas 0748 hrs 1-30-85 (2nd Count)	Kr-85m	(2.86 ± 0.02)E-2	(2.42 ± 0.6%)E-2	Agreement
	Kr-87	(6.86 ± 0.10)E-2	(5.79 ± 1.4)E-2	Agreement
	Kr-88	(6.86 ± 0.08)E-2	(6.22 ± 0.8%)E-2	Agreement
	Xe-133	(4.25 ± 0.03)E-2	(4.17 ± 0.5%)E-2	Agreement
	Xe-135	(1.303 ± 0.004)E-1	(1.11 ± 0.2%)E-1	Agreement

TABLE 1

PEACH BOTTOM 2 AND 3 VERIFICATION TEST RESULTS

SAMPLE	ISOTOPE	NRC VALUE	LICENSEE VALUE	COMPARISON
		RESULTS IN MICROCURIES PER MILLILITER		
Stackgas	Kr-85m	(2.0 ± 0.5)E-7	(3.5 ± 11.7%)E-7	Agreement
1120 hrs	Kr-87	(3.7 ± 0.7)E-7	(4.3 ± 12.1%)E-7	Agreement
1-29-85	Xe-133m	(3.8 ± 0.4)E-6	(4.47 ± 7.6%)E-6	Agreement
	Xe-133	(1.344 ± 0.006)E-4	(1.487 ± 0.4%)E-4	Agreement
	Xe-135m	(9 ± 3)E-7	(5.6 ± 18.5%)E-7	Agreement
	Xe-135	(1.048 ± 0.012)E-5	(1.177 ± 1.1%)E-5	Agreement
Stack Particulate				
Filter	I-131	(4 ± 2)E-13	(5.56 ± 15.3%)E-13	Agreement
1040 hrs	Ba-140	(1.8 ± 1.3)E-12	(1.8 ± 15%)E-12	Agreement
1-23-85	La-140	(1.4 ± 0.4)E-12	(1.3 ± 15%)E-12	Agreement
Stack Charcoal	I-131	(2.76 ± 0.06)E-11	(2.70 ± 2.2%)E-11	Agreement
Cartridge	I-133	(4.9 ± 0.7)E-12	(4.50 ± 8.5%)E-12	Agreement
1040 hrs				
1-28-85				

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.

$$\text{Resolution} = \frac{\text{NRC REFERENCE VALUE}}{\text{REFERENCE VALUE UNCERTAINTY}}$$

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

Resolution	Agreement
<3	0.4 - 2.5
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