

PHILADELPHIA ELECTRIC COMPANY  
PHILADELPHIA

PEACH BOTTOM ATOMIC POWER STATION  
Unit Nos. 2 and 3  
Docket Nos. 50-277 & 50-278

SEMI-ANNUAL EFFLUENT RELEASES REPORT

NO. 24

JULY 1, 1987 THROUGH DECEMBER 31, 1987

Submitted to  
The United States Nuclear Regulatory Commission  
Pursuant to  
Facility Operating Licenses DPR-44 & DPR-56

11/8/87

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Preparation Directed By:  
D. M. Smith, Vice President  
Peach Bottom Atomic Power Station

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Technical Concurrences: (for accuracy of information)

J. McFadden for M. F. Cassada 2/26/88  
Director-Radiation Protection Date

Walter Kutt 26 Feb 1988  
Director-Radwaste Date

I. INTRODUCTION

In accordance with the Unique Reporting Requirements of Technical Specification 6.9.2.h(2) applicable during the report period, this report summarizes the Effluent Release Data for the Peach Bottom Atomic Power Station Units 2 and 3 for the period July 1 through December 31, 1987. The notations E and E- are used to denote positive and negative exponents respectively, to the base 10.

The release of radioactive materials during the report period was within the Technical Specification limits. There were no changes to the Offsite Dose Calculation Manual (ODCM) during the reporting period.

Two unplanned releases of liquid radioactive material occurred from High Pressure Service Water (HPSW) during the report period. These events are discussed in the attachment section of the report.

Iodine was not detected from either the roof vents or main stack (see Gaseous Effluents - Table 1A), thus, the critical organ dose for iodines, in mRem, was zero. Therefore, a conservative approach was taken in accordance with a proposed revision to the Offsite Dose Calculation Manual (ODCM) to calculate the critical organ dose using the particulates with half-lives greater than 8 days. These calculations are incorporated into Attachment B of the report. Upon approval of the proposed revision to the Offsite Dose Calculation Manual (ODCM), the iodine dose calculation will be written into the appropriate tables of the next Semi-Annual Report.

In section labeled Liquid Effluents (Table 2B) the Phosphorus-32 reported value is less than the Lower Limit of Detection. Phosphorus-32's half-life has been exceeded by a factor of eight half-lives, therefore, Phosphorus-32 is reported as zero for this reporting period. In general, any isotopes experiencing decay by a number of half-lives greater than a factor of eight are reported as zero.

TABLE 1A  
 EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1987B)  
 GASEOUS EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit 2&3	Quarter 3	Quarter 4	Est. Total Error, %
<b>A. Fission &amp; activation gases</b>				
1. Total release	Ci	3.19 E2	3.05 E2	54.0 E0
2. Average release rate for period	uCi/sec	4.06 E1	3.88 E1	
3. Gamma Air Dose	Millirad	5.24 E-2	3.74 E-2	
Percent of Tech. Spec.	%	5.24 E-1	3.74 E-1	
4. Beta Air Dose	Millirad	2.24 E-2	1.83 E-2	
Percent of Tech. Spec.	%	1.12 E-1	9.15 E-2	
<b>B. Iodines</b>				
1. Total iodine-131	Ci	0	0	61.0 E0
2. Average release rate for period	uCi/sec	0	0	
3. Critical Organ Dose	Millirem	0	0	
Percent of Tech. Spec.	%	0	0	
<b>C. Particulates</b>				
1. Particulates with half-lives greater than 8 days (includes Alpha and Strontium 89-90)	Ci	4.53 E-4	4.23 E-4	61.0 E0
2. Average release rate for period	uCi/sec	5.76 E-5	5.38 E-5	
3. Gross Alpha Radioactivity	Ci	3.31 E-5	3.39 E-5	
<b>D. Tritium</b>				
1. Total release	Ci	1.96 E0	1.90 E0	94.0 E0
2. Average release rate for period	uCi/sec	2.48 E-1	2.41 E-1	

TABLE 16

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1987E)

## GASEOUS EFFLUENTS FOR RELEASE POINT: MAIN STACK

Nuclides Released	Unit 2 & 3	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission gases					
Krypton-85M	Ci	0	0	0	0
Krypton-87	Ci	0	0	0	0
Krypton-88	Ci	0	0	0	0
Xenon-133	Ci	0	0	0	0
Xenon-135	Ci	0	0	0	0
Xenon-135M	Ci	0	0	0	0
Xenon-138	Ci	0	0	0	0
Unidentified	Ci	2.35 E2	2.46 E2	0	0
Total for period	Ci	2.35 E2	2.46 E2	0	0
2. Iodines					
Iodine-131	Ci	0	0	0	0
Iodine-133	Ci	0	0	0	0
Iodine-135	Ci	0	0	0	0
Total for period	Ci	0	0	0	0
3. Particulates					
Strontium-89	Ci	4.50 E-7	4.50 E-7	0	0
Strontium-90	Ci	2.40 E-7	2.20 E-7	0	0
Strontium-91	Ci	0	0	0	0
Cesium-134	Ci	0	0	0	0



TABLE 1B (Continued)

Nuclides Released	Unit 2 & 3	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Cesium-137	Ci	0	0	0	0
Cesium-138	Ci	0	0	0	0
Barium-139	Ci	0	0	0	0
Barium-140	Ci	0	0	0	0
Lanthanum-140	Ci	0	0	0	0
Cobalt-57	Ci	0	0	0	0
Cobalt-58	Ci	0	0	0	0
Cobalt-60	Ci	0	0	0	0
Zinc-65	Ci	0	0	0	0
Yttrium-91M	Ci	0	0	0	0
Iodine-133	Ci	0	0	0	0
Copper-64	Ci	0	0	0	0
Rubidium-88	Ci	0	0	0	0
Manganese-54	Ci	0	0	0	0
Strontium-92	Ci	0	0	0	0
Cadmium-109	Ci	5.24 E-6	0	0	0
Totals	Ci	5.93 E-6	6.70 E-7	0	0



TABLE 1C

## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1987B)

## GASEOUS EFFLUENTS FOR RELEASE POINT: U/2 &amp; U/3 Roof Vents

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Unit 2&3	Quarter 3	Quarter 4	Quarter 3	Quarter 4
1. Fission gases					
Krypton-85M	Ci	0	0	0	0
Krypton-87	Ci	0	0	0	0
Krypton-88	Ci	0	0	0	0
Xenon-133	Ci	0	0	0	0
Xenon-135	Ci	0	0	0	0
Xenon-135M	Ci	0	0	0	0
Xenon-138	Ci	0	0	0	0
Xenon-133M	Ci	0	0	0	0
Unidentified	Ci	8.41 E1	5.84 E1	0	0
Total for period	Ci	8.41 E1	5.84 E1	0	0
2. Iodines					
Iodine-131	Ci	0	0	0	0
Iodine-133	Ci	0	0	0	0
Iodine-135	Ci	0	0	0	0
Total for period	Ci	0	0	0	0
3. Particulates					
Strontium-89	Ci	1.99 E-5	2.21 E-5	0	0
Strontium-90	Ci	9.86 E-6	1.20 E-5	0	0
Strontium-91	Ci	0	0	0	0
Cesium-134	Ci	0	0	0	0
Cesium-137	Ci	6.53 E-5	2.87 E-5	0	0

TABLE 1C (Continued)

Nuclides Released	Unit 2&3	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Cesium-138	Ci	0	0	0	0
Barium-139	Ci	0	0	0	0
Barium-140	Ci	0	0	0	0
Lanthanum-140	Ci	0	0	0	0
Cobalt-57	Ci	0	0	0	0
Cobalt-58	Ci	0	0	0	0
Cobalt-60	Ci	1.64 E-4	1.80 E-4	0	0
Zinc-65	Ci	1.58 E-4	2.12 E-4	0	0
Yttrium-91M	Ci	0	0	0	0
Iodine-133	Ci	0	0	0	0
Copper-64	Ci	0	0	0	0
Rubidium-88	Ci	0	0	0	0
Manganese-54	Ci	0	0	0	0
Strontium-92	Ci	0	0	0	0
Totals	Ci	4.17 E-4	4.55 E-4	0	0

TABLE 2A

## EFFLUENT AND WASTE DISPOSAL SEMI-ANNUAL REPORT (1987B)

## LIQUID EFFLUENTS - SUMMATION OF ALL RELEASES

	Unit 2&3	Quarter 3	Quarter 4	Est.Total Error, %
<b>A. Fission &amp; activation gases</b>				
1. Total release (not including tritium, gases, alpha)	Ci	8.99 E-2	4.96 E-2	32.0 E0
2. Average diluted concentration during period	uCi/ml	2.64 E-9	2.34 E-9	
3. Whole Body Dose	Millirem	2.26 E-1	1.94 E-1	
Percent of Technical Specification	%	7.53 E0	6.47 E0	
4. Bone Dose	Millirem	1.80 E-1	1.55 E-1	
Percent of Technical Specification	%	1.80 E-0	1.55 E0	
<b>B. Tritium</b>				
1. Total release	Ci	9.18 E0	4.99 E0	39.0 E0
2. Average diluted concentration during period	uCi/ml	2.70 E-7	2.36 E-7	
<b>C. Dissolved and entrained gases</b>				
1. Total release	Ci	0	0	42.0 E0
2. Average diluted concentration during period	uCi/ml	0	0	
<b>D. Gross alpha radioactivity</b>				
1. Total release	Ci	1.39 E-4	4.03 E-4	39.0 E0
2. Average diluted concentration during period	uCi/ml	4.09 E-12	1.90 E-11	
<b>E. Volume of waste released (prior to dilution)</b>				
	liters	6.05 E6	5.11 E6	32.0 E0
<b>F. Volume of dilution water used during period</b>				
	liters	3.40 E10	2.12 E10	30.0 E0

TABLE 2B

## EFFLUENT AND WASTE DISPOSAL SEMIANNUAL REPORT (1987B)

## LIQUID EFFLUENTS

CONTINUOUS MODE

BATCH MODE

Nuclides Released	Unit 2&3	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Strontium-89	Ci	0	0	9.73 E-5	6.08 E-5
Strontium-90	Ci	0	0	4.32 E-5	4.40 E-5
Alpha	Ci	0	0	1.39 E-4	4.03 E-4
Tritium	Ci	0	0	9.18 E0	4.99 E0
Phosphorus-32	Ci	0	0	0	0
Iron-55	Ci	0	0	6.30E-4	5.02E-4
Xenon-131M	Ci	0	0	0	0
Xenon-133	Ci	0	0	0	0
Xenon-133M	Ci	0	0	0	0
Xenon-135	Ci	0	0	0	0
Xenon-138	Ci	0	0	0	0
Krypton-85M	Ci	0	0	0	0
Krypton-87	Ci	0	0	0	0
Krypton-88	Ci	0	0	0	0
Xenon-135M	Ci	0	0	0	0
Manganese-54	Ci	0	0	1.07 E-5	3.81 E-5
Cesium-134	Ci	0	0	1.94 E-2	1.01 E-2
Cesium-137	Ci	0	0	2.91 E-2	1.50 E-2
Cesium-138	Ci	0	0	0	0
Zinc-65	Ci	0	0	2.88 E-2	1.82 E-2
Sodium-24	Ci	0	0	0	0
Cobalt-58	Ci	0	0	1.25 E-4	0
Cobalt-60	Ci	0	0	8.91 E-3	4.96 E-3
Iodine-131	Ci	0	0	0	0
Iodine-133	Ci	0	0	0	0
Molybdenum-99	Ci	0	0	0	0

TABLE 2B (Continued)

Nuclides Released	Unit 2&3	CONTINUOUS MODE		BATCH MODE	
		Quarter 3	Quarter 4	Quarter 3	Quarter 4
Iodine-135	Ci	0	0	0	0
Barium-140	Ci	0	0	0	0
Neptunium-239	Ci	0	0	0	0
Chromium-51	Ci	0	0	0	0
Yttrium-91M	Ci	0	0	0	0
Strontium-91	Ci	0	0	0	0
Antimony-122	Ci	0	0	0	0
Tellurium-132	Ci	0	0	0	0
Niobium-95	Ci	0	0	0	8.41 E-6
Lanthanum-140	Ci	0	0	0	0
Cadmium-109	Ci	0	0	0	0
Cesium-136	Ci	0	0	0	0
Silver-110M	Ci	0	0	3.96 E-4	0
Cesium-144	Ci	0	0	0	0
Antimony-124	Ci	0	0	0	0
Iron-59	Ci	0	0	0	0
Tellurium-129M	Ci	0	0	0	0
Tellurium-131M	Ci	0	0	0	0
Zirconium-95	Ci	0	0	0	0
Cerium-141	Ci	0	0	0	0
Total for Period (above)	Ci	0	0	9.27 E0	5.04 E0

TABLE 3

## PEACH BOTTOM UNITS 2 &amp; 3

JULY 1 TO DECEMBER 31, 1987 - CLASSES OF SOLID RADIOACTIVE WASTE SHIPMENTS

Total # of Shipments	Waste Description (Source of Waste)	Container/Type	Individual Container Volume (cubic feet)	Total (Waste & Container) Volume (cubic feet)	Total Curie	Principal Radionuclides
<u>CLASS A</u>						
7	Dewatered Resin	HIC/ Type A Cask	1,74.3 ft.3	1220.1 ft.3	132.469	Zn-65, Co-60, Cs-134, Cs-137
34	D.A.W.	Metal Drum LSA	7.5 ft.3 10.9 ft.3 12.25 ft.3	11737.5 ft.3 3488.0 ft.3 3136.0 ft.3	72.292	Zn-65, Co-60 Fe-55, Cs-134 Cs-137
*116	D.A.W.	Metal B-25 (Box)	96.0 ft.3	15,629.2 ft.3	18.829	Zn-65, Co-60 Fe-55, Cs-134 Cs-137
* 6	D.A.W. & Solidified Oil	Metal Box	80.3 ft.3	1884.1 ft.3	1.118	Co-60, Cs-137 Cs-134, Fe-55 Zn-65
* 9	Solidified Oil	Metal Box	80.3 ft.3	3409.1 ft.3	0.273	Fe-55, Zn-65, Co-60, Cs-137
<u>CLASS B</u>						
20	Dewatered Resin	HIC Type A Cask	174.3 ft.3	3486 ft.3	969.316	Zn-65, Co-60 Fe-55, Cs-134 Cs-137
1	Dewatered Resin	HIC Type A Cask	132.4 ft.3	132.4 ft.3	75.716	Zn-65, Co-60, Fe-55, Cs-134 Cs-137
1	Dewatered Resin	HIC Type B Cask	132.4 ft.3	132.4 Ft.3	680.497	Zn-65, Co-60 Fe-55, Cs-134 Cs-137

\* Indicates actual total PECO radwaste shipped from Quadrex, after volume reduction, to the burial site.



ATTACHMENT A  
SUPPLEMENTAL INFORMATION

Facility: Peach Bottom Units 2 & 3  
Licenses: DPR-44  
DPR-56

1. Regulatory Limits (Technical Specification Limits)

A. Noble Gases:

- |    |   |  |
|----|---|--|
| 1. | < 500 mRem/Yr - total body<br>≤ 3000 mRem/Yr - skin | - "instantaneous" limits per<br>Tech. Spec. 3.8.C.1.a    |
| 2. | < 10 mRad - gamma air<br>≤ 20 mRad - beta air       | - quarterly air dose limits per<br>Tech. Spec. 3.8.C.2.a |
| 3. | < 20 mRad - gamma air<br>≤ 40 mRad - beta air       | - yearly air dose limits per<br>Tech. Spec. 3.8.C.2.b    |

B. Iodines, Tritium, Particulates with Half Life > 8 days:

- |    |   |   |
|----|---|---|
| 1. | < 1500 mRem/Yr - any organ<br>(inhalation path) | - "instantaneous" limits per<br>Tech. Spec. 3.8.C.1.b |
| 2. | ≤ 15 mRem - any organ                           | - quarterly dose limits per<br>Tech. Spec. 3.8.C.3.a  |
| 3. | ≤ 30 mRem - any organ                           | - yearly dose limits per<br>Tech. Spec. 3.8.C.3.b     |

C. Liquid Effluents:

- |    |  |  |
|----|--|--|
| 1. | Concentration < 10 CFR 20,<br>Appendix B, Table II, Col. 2 | - "instantaneous" limits per<br>Tech. Spec. 3.8.B.1  |
| 2. | < 3.0 mRem - total body<br>≤ 10 mRem - any organ           | - quarterly dose limits per<br>Tech. Spec. 3.8.B.2.a |
| 3. | < 6.0 mRem - total body<br>≤ 20 mRem - any organ           | - yearly dose limits per<br>Tech. Spec. 3.8.B.2.b    |

2. Maximum Permissible Concentrations

MPCs are not used to calculate permissible release rates and concentrations for gaseous releases.

The MPCs specified in 10 CFR 20, Appendix B, Table II, Column 2, for identified nuclides are used to calculate permissible release rates and concentrations for liquid releases per Peach Bottom Technical Specification 3.8.B.1.



ATTACHMENT A (Continued)

3. Average Energy

Not applicable.

4. Measurements and Approximations of Total Radioactivity

A. Fission and Activation Gases

The method used is the Nuclear Data 6600/6700 Counting System  
- Gas Marinelli

B. Iodine

The method used in the Nuclear Data 6600/6700 Counting System  
- Charcoal Cartridge

C. Particulate:

The method used is the Nuclear Data 6600/6700 Counting System  
- Air Particulate Sample, 47 mm filter

D. Liquid Effluents:

The method used is the Nuclear Data 6600/6700 Counting System  
and the Radwaste Liquid Discharge Pre-Release Method with a  
liter bottle.

5. Batch Releases

A. Liquid

	<u>Q3</u>	<u>Q4</u>
# of Batch Releases:	71	79
Total Time for batch releases, minutes	18948	20340
Maximum time period for a batch release, minutes	340	340
Average time period for batch release, minutes	267	257
Minimum time period for a batch release, minutes	15	23
Dilution flow (Liters)	3.41 E10	2.12 E10

B. Gaseous: N/A

6. Abnormal Releases

A. Liquid: See Attachment B

B. Gaseous: None

ATTACHMENT F

SUMMARY OF UNPLANNED RELEASES

Unplanned Liquid Release Via the 3B High Pressure Service Water

On August 31, 1987, a suspected release was detected by a peak which occurred on the 3B High Pressure Service Water (HPSW) radiation monitor. A grab sample was obtained during the 5 minute duration of the event which showed detectable activity; however, activity could not be detected in later samples. The calculated doses are based on the methodology presented in the Offsite Dose Calculation Manual (ODCM), assuming a release rate of 4500 gpm (flowrate of one HPSW pump) and average release concentrations based on the sample obtained. A leak test was not performed because periodic monitoring of the system by recorder and grab samples indicated no levels of activity. The whole body dose as a result of the release was calculated at  $5.42E-5$  mRem, and the bone dose was calculated at  $6.08E-5$  mRem.

Unplanned Liquid Release Via the 2A High Pressure Service Water

On August 20, 1987, a suspected release was detected by a peak which occurred on the 3B HPSW radiation monitor. No grab sample was obtained during the 15 minute duration of the event. The calculated doses are based on the methodology presented in the ODCM assuming a release rate of 3 gpm and average release concentrations based on the radiation monitor strip chart. Because of the short duration, it is suspected that the indication may have been a possible radiation transient at the monitor. The whole body dose as a result of the release was calculated at  $3.37E-6$  mRem, and the bone dose was calculated at  $3.84E-5$  mRem.

ATTACHMENT B (Continued)

Calculations For Critical Organ Dose Using Particulates With  
Half-Lives Greater Than 8 Days

The following doses were calculated using particulates identified during the third and fourth quarter reporting period of 1987;

PARTICULATE	CRITICAL ORGAN DOSE, LIVER, (MREM)	
	<u>Quarter 3</u>	<u>Quarter 4</u>
Sr-89	7.69 E-8	4.58 E-9
Sr-90	3.26 E-6	3.60 E-7
Cs-137	4.15 E-5	1.82 E-5
Co-60	1.50 E-7	1.68 E-7
Zn-65	3.18 E-5	4.26 E-5
<hr/> Total	<hr/> 7.68 E-5	<hr/> 6.13 E-5

The percent of Technical Specification for the critical organ(liver) for the third quarter is 5.12E-4, fourth quarter is 4.09E-4.

PHILADELPHIA ELECTRIC COMPANY

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February 25, 1988

Docket No. 50-277  
50-278

Mr. William T. Russell, Administrator  
Region I  
U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D.C. 20555

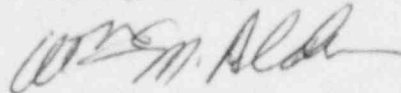
SUBJECT: Semi-Annual Effluent Releases Report No. 24  
July 1, 1987 through December 31, 1987  
Peach Bottom Atomic Power Station Unit Nos. 2 and 3

Dear Mr. Russell:

Enclosed are two copies of the Semi-Annual Effluent Releases Report No. 24, July 1 through December 31, 1987 for Peach Bottom Atomic Power Station Unit Nos. 2 and 3.

This report is being submitted in compliance with the Technical Specifications of Operating Licenses DPR-44 and DPR-56, and to fulfill the requirements of Regulatory Guide 10.1.

Very truly yours,



W. M. Alden  
Director  
Licensing Section

Attachments

cc: Addressee  
T. P. Johnson, PBAPS Site Inspector

JE48  
/