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Subject: Peach Bottom Atomic Power Station Units 1, 2 and 3  
Independent Spent Fuel Storage Installation (ISFSI)  
Facility Operation License DPR-12, DPR-44 and DPR-56  
NRC Docket 50-171, 50-277 and 50-278 and ISFSI Docket 72-29

Annual Radioactive Effluent Release Report 64  
January 1, 2021 through December 31, 2021

Enclosed is the Annual Radioactive Effluent Release Report 64, January 1, 2021 through December 31, 2021 for Peach Bottom Atomic Power Station, Units 1, 2 and 3.

This report is being submitted in compliance with 10 CFR 50.36a(2) and the Technical Specifications of Operating Licenses DPR-44 and DPR-56 and to fulfill the requirements of Offsite Dose Calculation Manual Specifications (ODCMS) 3.10.2. Additionally, this report is submitted to satisfy the annual effluent reporting requirements for the ISFSI required by the ODCM.

The ODCM was revised once during the 2021 reporting period. The revision is attached in Appendix A.

If you have any questions or require additional information, please do not hesitate to contact Dani Brookhart at 717-456-3056.

Sincerely,



Ronald J. DiSabatino Jr, Plant Manager  
Peach Bottom Atomic Power Station

RD/RM/TJH/DMJ/dlb

Enclosure (1)

Cc: Regional Administrator – NRC Region 1  
NRC Senior Resident Inspector – Peach Bottom Atomic Power Station

CCN 22-33

**PEACH BOTTOM ATOMIC POWER STATION**  
**Unit Numbers 2 and 3**  
**Docket Numbers 50-277 and 50-278**  
**Unit Number 1**  
**Docket Number 50-171**  
**PBAPS Independent Spent Fuel Storage Installation**  
**Docket Number 72-29**

**RADIOACTIVE EFFLUENT RELEASE REPORT**

**NO. 64**

**JANUARY 1, 2021 THROUGH DECEMBER 31, 2021**

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

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

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Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

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Technical Concurrence (for accuracy of information):

  
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Manager, Site Chemistry and Radwaste

4/21/22  
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Date

## INTRODUCTION

In accordance with the Reporting Requirements of Technical Specification 5.6.3 applicable during the reporting period, January 1, 2021 through December 31, 2021, this report summarizes the Effluent Release Data for Peach Bottom Atomic Power Station (PBAPS) Units 2 and 3. The notations E+ and E- are used to denote positive and negative exponents to the base 10, respectively.

The release of radioactive materials during the reporting period was within the Offsite Dose Calculation Manual Specification (ODCMS) limits.

In addition to the normal effluent releases from Units 2 and 3, there was one type of abnormal release of liquid low-level radioactive material, groundwater tritium contamination ('tritium plume'). These releases were far below regulatory limits.

For all gaseous releases from Units 2 and 3, the maximum calculated organ dose (bone) from iodines (I-131, I-133 and I-135), tritium (H-3), carbon-14 (C-14) and particulates to any individual was  $1.43\text{E-}01$  mrem, which was approximately  $4.75\text{E-}01\%$  of the annual limit. The maximum calculated air dose in the unrestricted area due to noble gas effluents was  $1.18\text{E-}01$  mrad (gamma) and  $8.09\text{E-}02$  mrad (beta), which was  $3.95\text{E-}01\%$  and  $1.35\text{E-}01\%$ , respectively, of the annual limits.

In 2021, there were no direct gaseous or liquid releases or discharges from Unit 1 to the environment. Additionally, there were no gaseous or liquid radioactive releases from the Independent Spent Fuel Storage Installation, NRC Docket No. 72-29 (ISFSI).

No changes were made to RW-AA-100 "Process Control Program for Radioactive Waste" in the 2021 reporting period. There was one change to the ODCM and the Appendix A during the 2021 reporting period.

Exelon Nuclear common procedures, which provide consistent expectations and standards for Radioactive Effluents Controls Program (RECP), were used to generate this report. PBAPS site specific procedures used to assist with abnormal/unplanned releases were also used to generate this report. They are:

- CY-AA-170-000, Radioactive Effluent and Environmental Monitoring Program
- CY-AA-170-100, Radiological Environmental Monitoring Program
- CY-AA-170-200, Radioactive Effluent Controls Program
- CY-AA-170-300, Offsite Dose Calculation Manual Administration
- CY-AA-170-2000, Annual Radioactive Effluent Release Report
- CY-AA-170-2100, Estimated Errors of Effluent Measurement
- CY-AA-170-3100, Offsite Dose Calculation Manual Revisions
- CY-AA-170-2300, Determination of Carbon-14 in Gaseous Effluents
- CY-PB-170-202, RHR-HPSW Leak Rate Calculation
- CY-PB-170-2020, Radiological Abnormal Gaseous Release Assessment
- CY-PB-170-210, Gaseous Dose and Dose Rate Calculation
- CY-PB-170-2000, Annual Radioactive Effluent Release Report
- CY-PB-170-2300, OpenEMS Effluent Management System Implementation
- Peach Bottom Atomic Power Station, Offsite Dose Calculation Manual and Specifications (Appendix A)

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

## **ATTACHMENT 1: SUPPLEMENTAL INFORMATION**

## Regulatory Limits

**Table 1. Noble Gas Dose Rate and Dose Limits**

Maximum Value	Units	Limit Classification	Specification
500	mrem/ yr	annual total body dose rate	ODCM Specification 3.8.C.1.a
3000	mrem/ yr	annual skin dose rate	ODCM Specification 3.8.C.1.a
10	mrads	gamma radiation in air dose per quarter	ODCM Specification 3.8.C.2.a
20	mrads	beta radiation in air dose per quarter	ODCM Specification 3.8.C.2.b
20	mrads	gamma radiation in air dose per year	ODCM Specification 3.8.C.2.c
40	mrads	beta radiation in air dose per year	ODCM Specification 3.8.C.2.d

**Table 2. Iodines, Tritium and Particulates (with half-lives >8 days) Dose Rate and Dose Limits**

Maximum Value	Units	Limit Classification	Specification
1500	mrem/ yr	annual dose rate limit to any organ	ODCM Specification 3.8.C.1.b
15	mrem	annual dose limit to any organ per quarter	ODCM Specification 3.8.C.3.a
30	mrem	dose limit to any organ per year	ODCM Specification 3.8.C.3.b

**Table 3. Liquid Effluent Activity Concentration and Dose Rate Limits**

Maximum Value	Units	Limit Classification	Specification
10 times 10 CFR 20, Appendix B, Table 2, Column 2	μCi/ mL	Activity Concentration in all liquid releases	ODCM Specification 3.8.B.1.a
2E-04	μCi/ mL	total activity concentration for all dissolved and entrained noble gases	ODCM Specification 3.8.B.1.b
3	mrem	total body dose limit per quarter	ODCM Specification 3.8.B.2.a
10	mrem	dose limit per quarter to any organ	ODCM Specification 3.8.B.2.a
6	mrem	total body dose limit per year	ODCM Specification 3.8.B.2.b
20	mrem	dose limit per year to any organ	ODCM Specification 3.8.B.2.b

### Maximum Permissible Concentrations

Gaseous dose rates, rather than effluent concentrations, are used to calculate permissible release rates for gaseous releases. The maximum permissible dose rates for gaseous releases are defined in ODCMS 3.8.C.1.a and 3.8.C.1.b.

The Effluent Concentrations Limits (ECL) specified in 10 CFR 20, Appendix B, Table 2, Column 2 multiplied by 10, for identified nuclides, are used to calculate permissible release rates and concentrations for liquid release per ODCMS 3.8.B.1.

The total activity concentration for all dissolved or entrained noble gases is limited to < 2E-04 μCi/mL (ODCMS 3.8.B.1.b).

### **Average Energy**

The PBAPS ODCM limits the dose-equivalent rates due to the release of noble gases to less than or equal to 500 mrem/year to the total body and less than or equal to 3000 mrem/year to the skin. Therefore, the average beta and gamma energies of the radionuclide mixture in releases of fission and activation gases as described in Regulatory Guide 1.21, Revision 1, "Measuring, Evaluation, and Reporting Radioactivity in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants," are not applicable to PBAPS.

### **Minimum Detectable Concentrations**

If a radionuclide was not detected, "<LLD" was reported as the activity. Samples were analyzed with techniques that achieved the required Lower Limits of Detection (LLD) specified in ODCMS Table 4.8.B.1, "Radioactive Liquid Waste Sampling and Analysis" (for liquids) or ODCMS Table 4.8.C.1, "Radioactive Gaseous Waste Sampling and Analysis from Main Stack and Vent Stack" (for gases). In all cases, the LLD requirements were satisfied.

### **Measures and Approximations of Total Radioactivity**

#### **Fission and Activation Gases**

The method used for gamma isotopic analysis is the Canberra Genie™ System with a gas marinelli beaker. Grab samples are taken and analyzed weekly to determine the isotopic mixture of noble gas activity released for the week. Airborne effluent gaseous activity was continuously monitored and recorded in accordance with ODCMS Table 4.8.C.1. The data from the noble gas radiation monitor were analyzed to report noble gas effluent activities. When no activity was identified in the grab isotopic analysis (un-id(s) or un-id(v)), the entire release must be assumed to be the radionuclide with the most-limiting dose factors for the release pathway (i.e. krypton-88 (Kr-88) for all ground-level releases, Kr-88 for elevated gamma dose and Kr-87 for elevated beta dose; see ODCM IV.B and NUREG-0133<sup>1</sup>). The activity released is listed as "unidentified" in the Attachment 2 Tables. If activity was found in the grab isotopic analysis, the isotopic mixture for the Noble Gas Monitor was determined from that isotopic mixture.

#### **Iodines**

The method used is the Canberra Genie™ System with a charcoal cartridge. Iodine activity was continuously sampled and analyzed in accordance with ODCMS Table 4.8.C.1.

#### **Particulates**

The method used is the Canberra Genie™ System with a particulate filter (47 mm diameter). Particulate activity was continuously sampled and analyzed in accordance with ODCM Table 4.8.C.1.

Composite particulate air samples were submitted to an offsite vendor laboratory for analyses of strontium-89 (Sr-89), Sr-90, nickel-63 (Ni-63) and gross alpha.

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<sup>1</sup> NUREG 0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants: A Guidance Manual for Users of Standard Technical Specifications," October 1978.

### **Carbon-14**

The amount of C-14 released was estimated using the guidance from the Electric Power Research Institute (EPRI) Technical Report 1021106, "Estimation of Carbon-14 in Nuclear Power Plant Gaseous Effluents". The C-14 was released primarily through the Main Offgas Stack (9.70E+01%) with a small amount (3.00E+00%) through the Reactor Building Exhaust Vents. The C-14 in liquid effluents is not a significant dose pathway, as determined from studies.

### **Liquid Effluents**

Gamma isotopic activity concentrations are determined on each batch of liquid effluent prior to release using the Canberra Genie™ System in accordance with ODCMS Table 4.8.B.1. The total activity of a released batch is determined by multiplying each nuclide's concentration by the total volume discharged.

Composite liquid radwaste samples are analyzed for tritium on-site and submitted to an offsite vendor laboratory for analyses of iron-55 (Fe-55), phosphorus-32 (P-32), Sr-89, Sr-90, Ni-63, and gross alpha.

### **Estimate of Total Error Present**

CY-AA-170-2100, "Estimated Errors of Effluent Measurements", provides the methodology to obtain an overall estimate of the error associated with radioactive effluents, which are listed in Attachment 2 of this report.

## **Decommissioned Unit 1 Liquid Radioactive Waste Processing**

There were no direct gaseous or liquid releases or discharges from Unit 1 to the environment during 2021. However, during the reporting period, a total of 223 gallons of water with low concentrations of H-3 were collected from Unit 1 and stored at Unit 2 and 3, for processing in a future year. No gamma emitting nuclides were identified above detectable limits in the U1 water collected from the containment or containment sump.

## Batch Releases

**Table 4. Quarterly Liquid Batch Release Statistics**

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Number of Batch Releases	19	4	2	14
Total Time for Batch Releases (minutes)	1.98E+03	3.25E+02	1.94E+02	1.57E+03
Maximum time period for batch release (minutes)	2.73E+02	1.18E+02	1.60E+02	1.67E+02
Average time period for batch release (minutes)	1.04E+02	8.13E+01	9.70E+01	1.12E+02
Minimum time period for batch release (minutes)	1.90E+01	3.00E+01	3.40E+01	4.80E+01
Average Stream Flow (ft <sup>3</sup> /s) <sup>2,3</sup>	4.59E+04	3.75E+04	4.45E+04	4.39E+04
Dilution volume (liters)	7.41E+09	1.48E+09	8.81E+08	5.87E+09

**Table 5. Quarterly Gaseous Batch Release Statistics**

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Number of batch releases:	0	0	0	0
Total Time for batch releases (minutes)	0	0	0	0
Maximum time period for batch release (minutes)	0	0	0	0
Average time period for batch release (minutes)	0	0	0	0
Minimum time period for batch release (minutes)	0	0	0	0

## Average Stream Flow

The river flow is not used for dose calculations. The actual flow rate of Circulation Water (the water that is circulated within the plant for cooling) is determined for each liquid effluent release because this Circulation Water provides dilution and therefore reduces the projected dose.

<sup>2</sup> Average Stream Flow is not used for dose calculation.

<sup>3</sup> USGS National Water Information System, Site Name: "Susquehanna River at Marietta, PA", Site Number: 01576000. Data accessed 4 April 2022.



### **Abnormal or Unplanned Releases**

'Abnormal' releases are those releases that are not defined as 'normal' releases in the Licensee's ODCM. Systems with a potential for an unplanned release are monitored to ensure if a release were to occur it would be identified and quantified appropriately. Source terms used for dose calculations utilize direct sampling and the maximum concentrations of nuclides to ensure that the most conservative and bounding estimates are used. Methodologies calculate conservative dose utilizing conservative mathematical models to describe intake and exposure pathways. Therefore, reported doses for these abnormal releases are calculated conservatively.

### **Liquid Releases**

#### *Groundwater Tritium Plume*

During 2021, during the sampling and analysis of the Radiological Ground Water Protection Program (RGPP), tritium was measured at several locations around the site. The ground water that has detectable tritium has been determined to flow into the plant intake and eventually flow into the normal discharge canal. Details of this program can be found in the Peach Bottom Annual Radiological Environmental Operating Report (AREOR) as an appendix. No other nuclides were detected in monitoring wells.

### **Analysis of Release**

It was assumed from the maximum flow rates measured that ground water flowed to the discharge canal at a steady rate of  $3.44\text{E}+02$  gpm, carrying with it some of the tritium underneath the plant. The ground water flow rate was updated in April 2017, when the new report was provided<sup>4</sup>. The conservative maximum dose for the entire year from this continuous release is calculated to be  $4.45\text{E}-05$  mrem (to the whole-body) and  $4.45\text{E}-05$  mrem (to any organ, except bone<sup>5</sup> which is  $0.00\text{E}+00$  mrem)<sup>6</sup>. This dose contribution projection is well below the limit specified in the ODCM.

### **Gaseous Releases**

There were no abnormal gaseous releases in 2021.

### **Missed Sampling**

There were no missed ODCM samples in 2021.

### **Radiation Monitors Out of Service for Greater than 30 days**

There were no Radiation Monitors Out of Service for greater than 30 days in 2021.

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<sup>4</sup> "Estimated Mass Flux Of Tritiated Groundwater To The Conowingo Reservoir And Rock Run Creek, Peach Bottom Atomic Power Station, Delta, Pennsylvania", August 2017, GHD formerly Conestoga-Rovers & Associates.

<sup>5</sup> Tritium dose factor for bone is  $0.00\text{E}+00$ ; therefore, no hypothetical dose is calculated.

<sup>6</sup> These doses are identical because the dose factors are identical for the same nuclide and pathway.

### **Changes to the ODCM**

There was one revision made to the ODCM and to the ODCM Specifications (Appendix A) during 2021. REMP Station Code U (Milk) was deleted and replaced with Farm S, 19,100 ft SE of site. This was due to Farm U no longer participating in the REMP. More detail can also be found in Appendix A.

### **Violations**

There were no effluent release violations for the 2021 reporting period.

## Dose Assessment

### Introduction

A dose assessment for PBAPS was conducted with the measured cumulative 2021 radioactive effluent source terms, provided in Attachment 2, "Effluent Summary," and the 2021 meteorological (MET) data. This dose assessment verifies that PBAPS continues to demonstrate compliance with the limits as well as the requirement of maintaining the doses "as low as is reasonably achievable" as stated in 10 CFR 50, Appendix I.<sup>7</sup>

### Liquid Dose Assessment

#### *Hydrologic Conditions and Receptor Locations of Interest*

PBAPS is located on the Conowingo Pond formed in the Susquehanna River by the Conowingo Dam. For 2021, the annual average river flow<sup>8</sup> was measured as 4.30E+04 ft<sup>3</sup>/s.

Of the three separate flow regimes that were used in the original Appendix I submittal, the most-limiting of them (<1.50E+04 ft<sup>3</sup>/s) was used to calculate a dose assessment for this report because this would provide a bounding extreme for all PBAPS liquid effluents. Therefore, although the actual average stream flow for the year was more than double the limiting case, this report will provide an upper limit for the most-limiting dose.

The annual average dilution factor<sup>9</sup> at the Conowingo Intake is 5.40E+00 and the assumption for the reconcentration factor<sup>9</sup> is 1.16E+00. The PBAPS shorewidth factor<sup>10</sup> of 2.00E-01 was also used.

No invertebrate intake was examined because invertebrate ingestion pathways are not considered to be significant in the area close to PBAPS. The pathway factors for the various age groups, used to determine dose to the public from liquid effluents are shown in Table 6.

**Table 6. Consumption and Usage Rate Assumptions**

Pathway	Adult	Teenager	Child	Infant	Units
Eating Fish <sup>10</sup>	2.10E+01	1.60E+01	6.90E+00	0.00E+00	kg/ yr
Drinking Water <sup>11</sup>	7.30E+02	5.10E+02	5.10E+02	5.10E+02	L/ yr
Swimming <sup>12</sup>	2.80E+02	2.80E+02	0.00E+00	0.00E+00	h/ yr
Boating <sup>12</sup>	1.20E+02	1.20E+02	6.70E+01	0.00E+00	h/ yr
Shoreline Recreation <sup>12</sup>	3.25E+02	3.25E+02	1.40E+01	0.00E+00	h/ yr
Fishing from Conowingo Dam <sup>12</sup>	3.25E+02	3.25E+02	0.00E+00	0.00E+00	h/ yr

<sup>7</sup> 10 CFR 50 Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion "As Low as is Reasonable Achievable" for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents".

<sup>8</sup> USGS National Water Information Service; Monitoring Site 01576000, Susquehanna River at Marietta, PA; <http://waterdata.usgs.gov/nwis>. Accessed 4 April 2021.

<sup>9</sup> From original ODCM.

<sup>10</sup> RG 1.109, Table A-2.

<sup>11</sup> All locations from RG 1.109, Section A-2. Chester Water Authority uses 10% of the RG 1.109 value because it is assumed to have 10% sourced from Conowingo Pond.

<sup>12</sup> PBAPS Environmental Report, Supplement No. 3, Page 19. Boating data is a ratio of Adult:Child rates from RG 1.109, Table A-2.

### *Liquid Effluent Dose Assessment Conclusion*

For all permitted releases in 2021, the calculated total body dose was 9.40E-05 mrem and 9.78E-05 mrem to the limiting organ of child Liver.

Therefore, PBAPS liquid radioactive effluent controls continue to demonstrate compliance with 10 CFR 50, Appendix I objectives for the purposes of keeping doses to members of the public "as low as is reasonably achievable". These limiting or maximum calculated doses are a small fraction of the limits in Appendix I.

### **Gaseous Dose Assessment**

The gaseous dose assessment calculates the conservative dose at the limiting receptor location, as defined in the ODCM and at locations from the land-use census, using the 2021 meteorology to demonstrate compliance with 10 CFR 50, Appendix I. The assessment compares the current ODCM locations to the maximum locations from the land use census to ensure the current ODCM locations are still the most impactful dose locations.

Tables 7 and 8 report the dose calculated with the CY-PB-170-210 spreadsheet using the 2021 MET data and total gaseous activity released (summarized in Attachment 2), including C-14. Table 7 focuses on the two locations with the highest elevated dispersion factor (X/Q) from the Main Offgas Stack, while Table 8 highlights the two locations with the highest ground deposition factor (D/Q) from the Reactor Building Exhaust Vents. The X/Q values are very similar to those used in the ODCM, and therefore the differences in noble gas dose is minimal. The larger discrepancies between Iodine, Particulates, Tritium (I/P/T) organ doses can be explained by the differences in pathways. Tables 7 and 8 assume that there is a milk pathway at each of the listed locations. The ODCM defines the milk pathway at 1500m SW and the D/Qs are more comparable (2021 vent: 1.92E-09 1/m<sup>2</sup> vs. ODCM vent: 1.58E-09 1/m<sup>2</sup>) and therefore, the dose calculated by ODCM methodology is more accurately representative of the dose to members of the public than the doses reported in Tables 7 and 8.

**Table 7. Conservative Maximum Elevated Release Dose from 2021 Source Term and 2021 Meteorology**

Distance (m)	Direction	2021 Highest MS X/Q (D/Q)	2021 Vent X/Q (D/Q)	TotalBody Dose (mrem)	Skin Dose (mrem)	Gamma Air Dose (mrad)	Beta Air Dose (mrad)	I/P/T/C-14 Dose (mrem)	Limiting Receptor
4600	N	3.80E-08 (2.76E-10)	1.20E-07 (6.05E-10)	1.26E-02	1.64E-02	1.30E-02	8.94E-03	1.64E-01	Bone
3800	SW	3.68E-08 (2.29E-10)	1.27E-07 (4.93E-10)	1.33E-02	1.73E-02	1.38E-02	9.42E-03	1.60E-01	Bone

**Table 8. Ground-Level Dose from 2021 Source Term and 2021 Meteorology**

Distance (m)	Direction	2021 Highest Vent D/Q (X/Q)	2021 MS X/Q (D/Q)	Total Body Dose (mrem)	Skin Dose (mrem)	Gamma Air Dose (mrad)	Beta Air Dose (mrad)	I/P/T/C-14 Dose (mrem)	Limiting Receptor
1200	SSE	1.00E-08 (1.07E-06)	5.13E-09 (8.38E-10)	1.410E-01	1.42E-01	1.13E-01	7.66E-02	1.50E-01	Bone
900	NW	9.15E-09 (1.53E-06)	5.24E-09 (6.33E-10)	1.56E-01	2.03E-01	1.62E-01	1.10E-01	2.06E-01	Bone

*Gaseous Radioactive Effluent Dose Assessment Conclusion*

The conservative maximum dose was  $1.43\text{E-}01$  mrem with the maximum receptor as the child bone which is due to the incorporation of carbon-14 in the calculation. Without C-14, the maximum dose is  $8.76\text{E-}03$  mrem to the infant thyroid. The noble gas limiting air doses were  $1.18\text{E-}01$  mrad (gamma) and  $8.09\text{E-}02$  mrad (beta). Noble gas plume conservative dose was  $1.14\text{E-}01$  mrem to the total body and  $1.49\text{E-}01$  to the skin mrem for the year.

A dose assessment was performed for members of the public due to their activities inside the site boundary, per ODCMS 3.10.2.f. The locations where a member of the public would spend a significant amount of time inside the site boundary are two new vehicle checkpoints, approximately 780 feet ENE (Emergency checkpoint) and 910 feet NNE (Warehouse checkpoint) of the PBAPS Unit 2 and Unit 3 reactor building exhaust vents. Assuming continuous occupancy, the calculated total body and skin doses were  $7.94\text{E-}01$  mrem and  $1.03\text{E+}00$  mrem for the Emergency checkpoint and  $9.21\text{E-}02$  mrem and  $1.19\text{E-}01$  mrem for the Warehouse checkpoint, respectively. The noble gas limiting air doses were  $8.21\text{E-}01$  mrad (gamma) and  $5.56\text{E-}01$  mrad (beta) for the Emergency checkpoint and  $9.52\text{E-}02$  mrad (gamma) and  $6.42\text{E-}02$  mrad (beta) for the Warehouse checkpoint. These doses are overly conservative, as typically vehicles and their drivers are not at the checkpoints 24/7. The maximum organ dose from the inhalation pathway, not including C-14, is  $1.37\text{E-}01$  mrem for the Emergency checkpoint and  $4.62\text{E-}02$  mrem for the Warehouse checkpoint, both to the infant thyroid.

All doses are projected to be much less than the limits, as expected. Again, these dose models incorporate several factors of conservatism including a source term that, by procedure, will use the most dose-limiting noble gas nuclide when no fission gas can be identified by grab sample, but activity is detected from the effluent radiation monitor. Exelon Nuclear uses a detailed C-14 dose projection from the Electric Power Research Institute, Technical Report 1021106. Details for the assumptions used in this calculation may be found there.<sup>15</sup>

Therefore, PBAPS gaseous radioactive effluent controls continue to demonstrate compliance with 10 CFR 50, Appendix I objectives for the purposes of keeping doses to members of the public "as low as is reasonably achievable". These limiting or maximum calculated doses are a small fraction of the limits in Appendix I.

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<sup>15</sup> PBAPS uses specific Boiling Water Reactor assumptions because the fraction of C-14 that is in the CO<sub>2</sub> form will vary based on general plant design. This is important because the major dose pathway is through photosynthesis and, therefore, only the oxide form is relevant.

## ERRATA

In 2020, there were two sections of the Effluent Summary Attachment that required revision. Firstly, the Total Iodine Ci was reported as Total I-131 in the Gaseous Effluents – Summation of All Releases section. Secondly, the Tritium in the Liquid Effluent Summation of All Releases section did not include the tritium from abnormal releases. Please see the corrected table sections below.

### Gaseous Effluents - Summation of All Releases

Period: January 1, 2020 through December 31, 2020

Unit: Peach Bottom

#### B. Iodines

1. Total I-131	Ci	7.88E-5	1.79E-4	2.39E-4	8.37E-5	1.90E+01
2. Average release For the Period	uCi/ s	1.02E-05	2.28E-05	3.01E-05	1.05E-05	
3. Percent of ODCM limit	%	*	*	*	*	

### Liquid Effluents - Summation of All Releases

Period: January 1, 2020 to December 31, 2020

Unit: Peach Bottom

B. Tritium						Est. Total Error %
1. Total Release	Ci	2.29E+00	2.49E+00	1.00E+00	2.96E+00	6.40E+00
2. Average diluted concentration for the Period	μCi/ mL	3.84E-09	3.74E-09	1.78E-09	5.08E-09	
3. Percent of applicable limit*	%	3.84E-04	3.74E-04	1.78E-04	5.08E-04	

\*10x 10CFR20 Limit of 1.00E-03 μCi/ mL; ODCMS 3.8.B.1.a

## **ATTACHMENT 2: EFFLUENT SUMMARY**

## Gaseous Effluents - Summation of All Releases

Period: January 1, 2021 through December 31, 2021

Unit: Peach Bottom

A. Fission & Activation Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error %
1. Total Release	Ci	9.45E+01	9.78E+01	8.72E+01	6.34E+00	4.00E+01
2. Average release For the Period	uCi/ s	1.22E+01	1.24E+01	1.04E+01	8.92E+00	
3. Gamma Air Dose	mrads	4.27E-02	4.08E-02	3.16E-02	3.30E-03	
4. Beta Air Dose	mrads	2.92E-02	2.79E-02	2.15E-02	2.24E-03	
5. Percent of ODCM limit						
Gamma Air Dose	%	2.85E-01	2.72E-01	2.10E-01	2.20E-02	
Beta Air Dose	%	9.72E-02	9.30E-02	7.18E-02	7.46E-03	

### B. Iodines

1. Total I-131	Ci	5.70E-05	1.34E-04	2.08E-04	4.81E-04	1.90E+01
2. Average release For the Period	uCi/ s	7.33E-06	1.70E-05	2.62E-05	6.05E-05	
3. Percent of ODCM limit	%	*	*	*	*	

\* No ODCM defined Curie Limit, therefore a percentage of the limit cannot be calculated.

### C. Particulate

1. Particulates with T1/2 > 8 days	Ci	8.26E-05	7.33E-05	7.84E-05	1.21E-04	2.80E+01
2. Average release For the Period	uCi/ s	1.06E-05	9.32E-06	9.86E-06	1.52E-05	
3. Percent of ODCM limit	%	*	*	*	*	

\* No ODCM defined Curie Limit, therefore a percentage of the limit cannot be calculated.

### D. Tritium

1. Total Release	Ci	4.25E+01	5.58E+01	2.65E+01	1.72E+01	1.30E+01
2. Average release For the Period	uCi/ s	5.47E+00	7.10E+00	3.33E+00	2.17E+00	
3. Percent of ODCM limit	%	*	*	*	*	

\* No ODCM defined Curie Limit, therefore a percentage of the limit cannot be calculated.

### E. Gross Alpha

1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	4.00E+02
2. Average release For the Period	uCi/ s	<LLD	<LLD	<LLD	<LLD	
3. Percent of ODCM limit	%	*	*	*	*	

\* No ODCM defined Curie Limit, therefore a percentage of the limit cannot be calculated.

### F. Carbon-14

1. Total Release	Ci	9.78E+00	9.78E+00	9.78E+00	9.78E+00	
2. Average release For the Period	uCi/ s	1.26E+00	1.24E+00	1.23E+00	1.23E+00	

### G. Iodine-131, 133 and 135, Tritium, Carbon-14 & Particulate

1. Organ Dose*	mrem	3.56E-02	3.56E-02	3.56E-02	3.56E-02	
2. Percent ODCM limit	%	2.38E-01%	2.38E-01%	2.38E-01%	2.38E-01%	

\*C-14 contributes most significantly; therefore, the quarterly dose to the child bone is reported



### Gaseous Effluents Release Point: Elevated (Main Offgas Stack)

Period: January 1, 2021 through December 31, 2021

Unit: Peach Bottom

Nuclides Released		Continuous Mode				Batch Mode			
1. Fission Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Unidentified	Ci	8.00E+00	8.21E+00	2.76E+00	<LLD	<LLD	<LLD	<LLD	<LLD
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	2.07E+00	2.56E+00	8.44E-02	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	2.26E-02	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	4.44E+00	1.65E+01	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	7.58E+00	4.15E+00	1.09E+00	1.56E-01	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	3.62E+00	1.47E+00	<LLD	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	1.56E+01	2.25E+01	2.44E+01	2.40E-01	<LLD	<LLD	<LLD	<LLD
<b>2. Iodines</b>									
I-131	Ci	4.05E-05	5.94E-05	6.95E-05	1.34E-04	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	2.26E-05	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	1.38E-04	2.84E-04	2.00E-04	2.68E-04	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	1.64E-04	6.74E-05	4.82E-05	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	1.78E-04	4.74E-04	3.37E-04	4.50E-04	<LLD	<LLD	<LLD	<LLD
<b>3. Particulates</b>									
Sr-89	Ci	7.37E-05	6.07E-05	6.48E-05	4.56E-05	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	2.83E-07	<LLD	1.72E-07	<LLD	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	8.26E-06	1.10E-05	1.17E-05	7.60E-06	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	3.79E-07	<LLD	5.39E-07	5.26E-06	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	8.26E-05	7.17E-05	7.84E-05	5.84E-05	<LLD	<LLD	<LLD	<LLD
<b>4. Tritium</b>									
H-3	Ci	4.08E-00	2.33E+00	8.77E+00	3.20E+00	<LLD	<LLD	<LLD	<LLD
<b>5. Gross Alpha</b>									
Gross Alpha	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
<b>6. Carbon-14</b>									
C-14	Ci	9.49E+00	9.49E+00	9.49E+00	9.49E+00	<LLD	<LLD	<LLD	<LLD

**Gaseous Effluents Release Point: Ground-Level (Units 2 and 3 Reactor Building Exhaust Vents and Abnormal Releases)**

Period: January 1, 2021 through December 31, 2021

Unit: Peach Bottom

Nuclides Released		Continuous Mode				Batch Mode			
1. Fission Gases	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Kr-85	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-85m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-87	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Kr-88	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-135m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ar-41	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Unidentified	Ci	7.89E+01	7.53E+01	5.53E+01	6.12E+00	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	7.89E+01	7.53E+01	5.53E+01	6.12E+00	<LLD	<LLD	<LLD	<LLD
2. Iodines									
I-131	Ci	1.65E-05	7.46E-05	1.39E-04	3.47E-04	<LLD	<LLD	<LLD	<LLD
I-132	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
I-133	Ci	1.24E-04	4.47E-04	8.09E-04	1.98E-04	<LLD	<LLD	<LLD	<LLD
I-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	1.41E-04	5.22E-04	9.48E-03	5.45E-04	<LLD	<LLD	<LLD	<LLD
3. Particulates									
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	1.65E-06	<LLD	4.36E-06	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	5.83E-05	<LLD	<LLD	<LLD	<LLD
Sb-124	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ce-144	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Total For Period	Ci	<LLD	1.65E-06	<LLD	6.27E-05	<LLD	<LLD	<LLD	<LLD
4. Tritium									
H-3	Ci	3.84E+01	5.35E+01	1.77E+01	1.40E+01	<LLD	<LLD	<LLD	<LLD
5. Gross Alpha									
Gross Alpha	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
6. Carbon-14									
C-14	Ci	2.94E-01	2.94E-01	2.94E-01	2.94E-01	<LLD	<LLD	<LLD	<LLD

## Liquid Effluents - Summation of All Releases

Period: January 1, 2021 to December 31, 2021

Unit: Peach Bottom

A. Fission & Activation Gases	Units	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Est. Total Error %
1. Total Release (not including tritium, gases & alpha)	Ci	8.41E-04	1.39E-04	1.10E-06	2.77E-05	1.60E+01
2. Average diluted concentration for the Period	µCi/ mL	1.14E-10	9.40E-11	1.25E-12	4.72E-12	
3. Percent of applicable limit						
Total Body Dose*	%	7.99E-04%	2.29E-04%	3.68E-05%	1.05E-03%	
Organ Dose*	%	2.61E-04%	7.59E-05%	1.75E-05%	3.18E-04%	

\*ODCMS 3.8.B.2.a and ODCMS 3.8.B.2.b (page 7) define the dose limit

B. Tritium						Est. Total Error %
1. Total Release	Ci	4.06E+00	2.13E+00	1.61E+00	3.77E+00	6.40E+00
2. Average diluted concentration for the Period	µCi/ mL	6.51E-09	3.19E-09	2.38E-09	5.71E-09	
3. Percent of applicable limit*	%	6.51E-04%	3.19E-04%	2.38E-04%	5.71E-04%	

\*10x 10CFR20 Limit of 1.00E-03 µCi/ mL; ODCMS 3.8.B.1.a

C. Dissolved & Entrained Gases						Est. Total Error %
1. Total Release	Ci	1.67E-05	<LLD	<LLD	2.92E-06	2.80E+01
2. Average diluted concentration for the Period	µCi/ mL	2.25E-12	<LLD	<LLD	4.97E-13	
3. Percent of ODCM limit*	%	1.12E-06%	<LLD	<LLD %	2.48E-07%	

\*ODCMS 3.8.B.1.b Limit for all noble gases is 2.00E-04 µCi/ mL

D. Gross Alpha Activity						Est. Total Error %
1. Total Release	Ci	<LLD	<LLD	<LLD	<LLD	2.30E+01

E. Volume of Waste Released (prior to dilution)	Liters	1.72E+08	1.71E+08	1.72E+08	1.73E+08
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F. Volume of Dilution Water Used During Period	Liters	6.32E+11	6.69E+11	6.78E+11	6.66E+11
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## Liquid Effluents Release Points – Liquid Radwaste, RHR Leaks and Groundwater

Period: January 1, 2021 through December 31, 2021

Unit: Peach Bottom

Nuclides Released		Continuous Mode				Batch Mode			
	Unit	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Sr-89	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Sr-90	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-134	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Cs-137	Ci	<LLD	<LLD	<LLD	<LLD	8.56E-07	1.73E-07	7.58E-07	<LLD
I-131	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-58	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Co-60	Ci	<LLD	<LLD	<LLD	<LLD	8.43E-06	2.03E-07	2.05E-07	1.23E-05
Fe-59	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Zn-65	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mn-54	Ci	<LLD	<LLD	<LLD	<LLD	3.68E-06	4.85E-07	1.36E-07	5.19E-06
Cr-51	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Zr-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Nb-95	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Mo-99	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Tc-99m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ba-140	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
La-140	Ci	<LLD	<LLD	<LLD	<LLD	5.67E-05	1.17E-04	<LLD	9.92E-06
Ce-141	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Ag-110m	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	2.06E-05	<LLD	<LLD
Fe-55	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Sb-124	Ci	<LLD	<LLD	<LLD	<LLD	4.32E-04	<LLD	<LLD	<LLD
Sb-125	Ci	<LLD	<LLD	<LLD	<LLD	3.40E-05	<LLD	<LLD	<LLD
Ni-63	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
H-3	Ci	1.54E+00	1.27E+00	1.61E+00	4.87E-01	2.52E+00	8.64E-01	2.08E-03	3.28E-00
P-32	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period	Ci	1.54E+00	1.27E+00	1.61E+00	4.87E-01	2.52E+00	8.64E-01	2.08E-03	3.28E-00
Xe-133	Ci	<LLD	<LLD	<LLD	<LLD	1.67E-05	<LLD	<LLD	2.92E-06
Xe-135	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Xe-138	Ci	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD	<LLD
Total for Period (ex-tritium, gases and alpha)	Ci	<LLD	<LLD	<LLD	<LLD	8.41E-04	1.39E-04	1.10E-06	2.77E-05

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

### **ATTACHMENT 3: SOLID WASTE AND IRRADIATED FUEL SHIPMENTS**

## Solid Waste Shipped

### 1.Type of Waste

	Units	2021	Est. error %
A: Spent Resin, Filters, Sludges, Evaporator Bottoms, etc.	m <sup>3</sup>	8.42E+01	
	Ci	2.56E+02	2.50E+01
B: Dry Compressible Waste, Contaminated Equipment, etc.	m <sup>3</sup>	7.41E+02	
	Ci	1.10E+02	2.50E+01
C: Irradiated Components, Control Rods, etc.	m <sup>3</sup>	0.00E+00	
	Ci	0.00E+00	2.50E+01
D: Other (Oil, SBLC)	m <sup>3</sup>	4.21E+01	
	Ci	1.50E-03	2.50E+01

### 2.Estimate of Major Nuclide Composition (by type of waste)

#### a. Spent-Resin, Filters, Sludges, Evaporator Bottoms, etc.

Nuclide	Abundance % (no cutoff)	Activity (Ci)
H-3	0.16%	4.22E-01
C-14	0.54%	1.39E+00
Cr-51	0.00%	7.60E-07
Mn-54	2.04%	5.22E+00
Fe-55	16.95%	4.34E+01
Fe-59	0.00%	1.75E-05
Co-57	0.00%	1.26E-02
Co-58	0.00%	1.08E-02
Co-60	73.39%	1.88E+02
Ni-63	1.01%	2.59E+00
Zn-65	2.25%	5.76E+00
Se-75	0.00%	1.21E-03
Sr-89	0.00%	8.95E-06
Sr-90	0.01%	1.75E-02
Zr-95	0.00%	3.15E-05
Nb-95	0.00%	7.00E-05

Nuclide	Abundance % (no cutoff)	Activity (Ci)
Ag-110m	0.21%	5.35E-01
Sb-124	0.00%	3.86E-05
Sb-125	0.01%	3.48E-02
I-131	0.00%	0.00E+00
Cs-134	0.09%	2.31E-01
Cs-137	3.29%	8.43E+00
Ba-140	0.00%	0.00E+00
La-140	0.00%	0.00E+00
Ce-141	0.00%	1.70E-07
Ce-144	0.02%	5.35E-02
Pu-238	0.00%	3.49E-04
Pu-239	0.00%	2.25E-05
Pu-241	0.01%	2.02E-02
Am-241	0.00%	1.92E-04
Cm-242	0.00%	5.72E-06
Cm-244	0.00%	2.51E-04

## Waste Class A

[illegible]

**Waste Class C**

Nuclide	Abundance % (no cutoff)	Activity (Ci)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Nuclide	Abundance % (no cutoff)	Activity (Ci)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

*c. Irradiated Components, Control Rods, etc.*

Nuclide	Abundance % (no cutoff)	Activity (Ci)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

Nuclide	Abundance % (no cutoff)	Activity (Ci)
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

*d. Other: Oil*

Nuclide	Abundance % (no cutoff)	Activity (Ci)
H-3	0.00%	0.00E+00
Cr-51	12.48%	1.87E-04
Mn-54	2.34%	3.50E-05
Fe-55	11.69%	1.75E-04
Fe-59	3.82%	5.72E-05
Co-57	0.08%	1.21E-06
Co-58	12.60%	6.43E-04
Co-60	42.97%	6.43E-04

Nuclide	Abundance % (no cutoff)	Activity (Ci)
Ni-63	0.95%	1.42E-05
Zn-65	7.68%	1.15E-04
Ag-110m	2.89%	4.33E-05
Sb-124	0.42%	6.22E-05
Cs-137	1.33%	1.99E-05
Ce-141	0.22%	3.27E-06
Ce-144	0.53%	7.87E-06



### **3. Solid Waste Disposition**

<b>Number of shipments</b>	<b>Mode of Transportation</b>	<b>Destination</b>
13	Hittman Transport Services	Energy Solutions Services (CVRF) Bear Creek Operations
4	Hittman Transport Services	Energy Solutions Services (GRF) Gallaher Road Operations
2	Hittman Transport Services	Energy Solutions - BWF
19	Hittman Transport Services	Energy Solutions LLC - Clive Disposal Site - Containerized Waste Facility
1	Landstar - Ranger	Toxco Inc. - Oak Ridge, TN

#### **Irradiated Fuel Shipments**

No shipment of irradiated fuel was made during the reporting period of 2021.

#### **Changes to Process Control Program (PCP)**

There were no changes made to RW-AA-100 "Process Control Program for Radioactive Waste" during the 2021 reporting period.

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

#### **ATTACHMENT 4: RADIOLOGICAL IMPACT ON MAN**

### Radiological Impact on Man

Effluent	Applicable Organ	Estimated Dose	Age Group	Location		% of Applicable Limit	Limit	Unit
				Distance (meters)	Direction (toward)			
Noble Gas	Gamma - Air Dose	1.18E-01	All	1.10E+03	SSE	5.90E-01	2.00E+01	mrads
Noble Gas	Beta - Air Dose	8.09E-02	All	1.10E+03	SSE	2.02E-01	4.00E+01	mrads
Noble Gas	Total Body (gamma)	1.14E-01	All	1.10E+03	SSE	1.14E+00	1.00E+01	mrem
Noble Gas	Skin (Beta)	1.49E-01	All	1.10E+03	SSE	4.97E-01	3.00E+01	mrem
Gaseous Iodine, Particulate, Carbon-14 & Tritium	Bone	1.43E-01	Child	1.50E+03	SW	4.77E-01	3.00E+01	mrem
Gaseous Iodine, Particulate & Tritium	Thyroid	8.76E-03	Infant	1.50E+03	SW	2.92E-02	3.00E+01	mrem
Liquid	Total Body (gamma)	9.40E-05	Child	Site Boundary		1.57E-03	6.00E+00	mrem
Liquid	GI-LLI	3.47E-04	Adult			4.91E-04	2.00E+01	mrem
Direct Radiation	Total Body	0	All	1.19E+03	SSE	0.00E+00	2.50E+01	mrem

### 40 CFR 190 Doses

Effluent	Applicable Organ	Estimated Dose	Age Group	Location		% of Applicable Limit	Limit	Unit
				Distance (meters)	Direction (toward)			
Total Dose	Total Body	1.14E-01	All	1.19E+03	SSE	4.56E-01	2.50E+01	mrem
Total Dose	Thyroid	8.76E-03	All	1.19E+03	SSE	1.17E-02	7.50E+01	mrem
Total Dose	Bone	1.43E-01	All	1.19E+03	SSE	5.72E-01	2.50E+01	mrem
Total Dose	Total Body	1.14E-01	All	1.19E+03	SSE	3.80E+00	3.00E+00	mrem
Total Dose	Bone	1.43E-01	All	1.19E+03	SSE	4.77E+00	3.00E+00	mrem
Total Dose	Thyroid	1.27E-01	All	1.19E+03	SSE	2.30E-01	5.50E+01	mrem

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

## **ATTACHMENT 5: METEOROLOGICAL DATA**

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Extremely Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	3	1	0	0	0	6
NNE	4	1	0	1	0	0	6
NE	6	3	0	0	0	0	9
ENE	12	2	0	0	0	0	14
E	9	12	0	0	0	0	21
ESE	1	9	1	0	0	0	11
SE	1	7	1	0	0	0	9
SSE	0	2	4	3	0	0	9
S	1	2	5	1	0	0	9
SSW	1	0	2	0	0	0	3
SW	7	1	0	0	0	0	8
WSW	7	1	1	0	0	0	9
W	5	3	2	0	0	0	10
WNW	3	5	3	1	0	0	12
NW	8	6	5	4	0	0	23
NNW	0	11	12	3	0	0	26
Variable	0	0	0	0	0	0	0
Total	67	68	37	13	0	0	185

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021

Stability Class - Moderately Unstable - 150Ft-33Ft Delta-T (F)

Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	5	1	2	0	0	10
NNE	5	8	2	1	0	0	16
NE	11	0	0	0	0	0	11
ENE	11	0	0	0	0	0	11
E	3	6	0	0	0	0	9
ESE	4	6	0	0	0	0	10
SE	0	7	1	0	0	0	8
SSE	0	0	2	0	0	0	2
S	1	1	2	0	0	0	4
SSW	1	1	1	0	0	0	3
SW	2	0	3	0	0	0	5
WSW	2	0	2	0	0	0	4
W	1	1	6	1	3	0	12
WNW	0	4	14	5	0	0	23
NW	0	2	11	17	2	0	32
NNW	1	7	20	1	0	0	29
Variable	0	0	0	0	0	0	0
Total	44	48	65	27	5	0	189

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Slightly Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
0	1	1	1	0	0	3	
NNE	3	3	1	1	0	0	8
NE	9	2	0	0	0	0	11
ENE	4	1	0	0	0	0	5
E	2	4	0	0	0	0	6
ESE	1	4	0	0	0	0	5
SE	1	3	0	0	0	0	4
SSE	0	2	4	0	0	0	6
S	0	2	3	0	0	0	5
SSW	0	0	1	0	0	0	1
SW	0	1	2	1	0	0	4
WSW	0	0	2	0	1	0	3
W	0	1	6	1	0	0	8
WNW	1	6	10	3	0	0	20
NW	1	3	13	13	0	0	30
NNW	0	7	15	9	1	0	32
Variable	0	0	0	0	0	0	0
Total	22	40	58	29	2	0	151

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Neutral- 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	20	42	15	8	0	0	85
NNE	17	35	8	0	0	0	60
NE	43	13	1	0	0	0	57
ENE	46	1	0	0	0	0	47
E	35	10	0	0	0	0	45
ESE	12	13	1	0	0	0	26
SE	0	26	9	0	0	0	35
SSE	0	16	11	0	0	0	27
S	2	8	12	0	0	0	22
SSW	2	2	1	0	0	0	5
SW	1	3	11	0	0	0	15
WSW	3	6	16	2	1	0	28
W	2	14	32	7	0	0	55
WNW	4	36	83	11	0	0	134
NW	5	52	98	60	1	0	216
NNW	8	77	69	25	0	0	179
Variable	0	0	0	0	0	0	0
Total	200	354	367	113	2	0	1036

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3



Peach Bottom Atomic Power Station

Period of Record: January - March 2021

Stability Class - Slightly Stable - 150Ft-33Ft Delta-T (F)

Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	7	2	0	0	0	0	9
NNE	10	0	0	0	0	0	10
NE	7	0	0	0	0	0	7
ENE	13	1	0	0	0	0	14
E	13	1	0	0	0	0	14
ESE	14	6	0	0	0	0	20
SE	7	11	1	0	0	0	19
SSE	5	7	3	0	0	0	15
S	8	6	2	0	0	0	16
SSW	3	6	0	0	0	0	9
SW	4	15	4	0	0	0	23
WSW	7	44	9	0	0	0	60
W	9	39	11	0	0	0	59
WNW	13	20	5	0	0	0	38
NW	9	19	1	0	0	0	29
NNW	12	22	0	0	0	0	34
Variable	0	0	0	0	0	0	0
Total	141	199	36	0	0	0	376

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021

Stability Class - Moderately Stable - 150Ft-33Ft Delta-T (F)

Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
10	0	0	0	0	0	10	
NNE	7	0	0	0	0	0	7
NE	6	0	0	0	0	0	6
ENE	4	0	0	0	0	0	4
E	14	0	0	0	0	0	14
ESE	9	0	0	0	0	0	9
SE	2	0	0	0	0	0	2
SSE	1	0	0	0	0	0	1
S	2	0	0	0	0	0	2
SSW	9	3	0	0	0	0	12
SW	8	4	0	0	0	0	12
WSW	8	10	1	0	0	0	19
W	15	4	0	0	0	0	19
WNW	12	0	0	0	0	0	12
NW	8	0	0	0	0	0	8
NNW	2	1	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	117	22	1	0	0	0	140

Hours of calm in this stability class: 1

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Extremely Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	0	0	0	0	0	4
NNE	1	0	0	0	0	0	1
NE	4	0	0	0	0	0	4
ENE	7	0	0	0	0	0	7
E	6	0	0	0	0	0	6
ESE	6	0	0	0	0	0	6
SE	1	0	0	0	0	0	1
SSE	0	0	0	0	0	0	0
S	1	0	0	0	0	0	1
SSW	3	0	0	0	0	0	3
SW	3	0	0	0	0	0	3
WSW	15	1	0	0	0	0	16
W	8	0	0	0	0	0	8
WNW	7	0	0	0	0	0	7
NW	5	0	0	0	0	0	5
NNW	7	0	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	78	1	0	0	0	0	79

Hours of calm in this stability class: 3  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Extremely Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	2	0	0	0	2
SE	0	0	0	1	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	2	1	0	0	3

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Moderately Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

		Wind Speed (in mph)						Total
Wind Direction		1-3	4-7	8-12	13-18	19-24	> 24	
0	0	0	0	0	0			
	NNE	0	0	0	0	0	0	0
	NE	0	0	0	0	0	0	0
	ENE	0	0	0	0	0	0	0
	E	0	1	0	0	0	0	1
	ESE	0	0	0	0	0	0	0
	SE	0	0	1	1	0	0	2
	SSE	0	0	0	0	0	0	0
	S	0	0	0	0	2	0	2
	SSW	0	0	0	0	0	0	0
	SW	0	0	0	0	0	0	0
	WSW	0	0	0	0	0	0	0
	W	0	0	0	0	0	0	0
	WNW	0	0	0	0	0	0	0
	NW	0	0	0	0	0	0	0
	NNW	0	0	0	0	0	0	0
	Variable	0	0	0	0	0	0	0
	Total	0	1	1	1	2	0	5

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Slightly Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
0	0	0	0	0	0	0	
NNE	0	2	0	0	0	0	2
NE	0	0	0	0	0	0	0
ENE	0	2	0	0	0	0	2
E	2	8	0	0	0	0	10
ESE	0	6	0	0	0	0	6
SE	0	0	1	0	0	0	1
SSE	0	0	0	2	0	0	2
S	0	0	0	3	1	0	4
SSW	0	0	0	0	0	0	0
SW	0	0	1	0	0	0	1
WSW	0	0	0	0	0	0	0
W	0	0	2	2	0	1	5
WNW	0	0	0	2	5	0	7
NW	0	0	0	0	2	0	2
NNW	0	0	0	1	0	0	1
Variable	0	0	0	0	0	0	0
Total	2	18	4	10	8	1	43

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Neutral- 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	21	37	26	10	6	103
NNE	2	26	30	8	4	2	72
NE	10	26	15	10	3	0	64
ENE	10	24	13	1	0	0	48
E	11	30	13	2	0	0	56
ESE	4	13	29	14	0	0	60
SE	2	12	34	14	0	0	62
SSE	0	4	19	11	0	0	34
S	0	2	14	29	6	0	51
SSW	1	4	3	11	1	0	20
SW	0	2	8	6	2	1	19
WSW	0	3	3	17	3	3	29
W	0	9	13	18	22	4	66
WNW	0	11	19	56	50	12	148
NW	0	12	39	95	113	31	290
NNW	0	37	91	66	53	6	253
Variable	0	0	0	0	0	0	0
Total	43	236	380	384	267	65	1375

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Slightly Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	13	13	3	0	0	31
NNE	3	10	9	0	0	0	22
NE	0	9	6	0	0	0	15
ENE	1	7	2	0	0	0	10
E	1	11	11	4	0	0	27
ESE	0	4	18	7	1	0	30
SE	2	11	11	5	1	0	30
SSE	2	2	11	8	0	0	23
S	1	2	10	13	3	0	29
SSW	2	2	2	5	0	0	11
SW	1	10	14	9	3	0	37
WSW	1	3	24	26	2	0	56
W	2	1	16	37	4	1	61
WNW	1	6	6	22	15	1	51
NW	0	8	20	23	4	1	56
NNW	1	8	24	15	0	0	48
Variable	0	0	0	0	0	0	0
Total	20	107	197	177	33	3	537

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3



Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Moderately Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	0	0	0	0	3
NNE	0	0	2	0	0	0	2
NE	0	2	1	0	0	0	3
ENE	2	2	0	0	0	0	4
E	3	7	7	1	0	0	18
ESE	1	3	1	0	0	0	5
SE	1	2	7	2	0	0	12
SSE	0	5	3	2	0	0	10
S	1	3	6	2	0	0	12
SSW	2	2	7	0	0	0	11
SW	2	2	4	1	0	0	9
WSW	0	4	2	8	1	0	15
W	0	2	3	5	2	0	12
WNW	0	3	2	2	0	0	7
NW	0	4	4	0	0	0	8
NNW	0	5	2	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	12	49	51	23	3	0	138

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: January - March 2021  
Stability Class - Extremely Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	0	0	0	2
NNE	0	3	1	0	0	0	4
NE	0	0	0	0	0	0	0
ENE	0	0	1	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	2	0	0	0	0	2
SSE	0	1	0	0	0	0	1
S	0	0	0	0	0	0	0
SSW	0	1	2	1	0	0	4
SW	1	1	9	1	0	0	12
WSW	1	1	2	3	0	0	7
W	0	4	7	2	0	0	13
WNW	0	3	2	0	0	0	5
NW	0	2	1	0	0	0	3
NNW	0	2	0	0	0	0	2
Variable	0	0	0	0	0	0	0
Total	2	20	27	7	0	0	56

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 3

Peach Bottom Atomic Power Station

Period of Record: April - June 2021

Stability Class - Extremely Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	14	3	0	0	0	19
NNE	2	14	0	0	0	0	16
NE	13	4	0	0	0	0	17
ENE	24	3	0	0	0	0	27
E	18	11	0	0	0	0	29
ESE	5	5	3	0	0	0	13
SE	0	14	4	0	0	0	18
SSE	0	10	12	1	0	0	23
S	1	7	12	0	0	0	20
SSW	1	0	1	0	0	0	2
SW	1	0	1	1	0	0	3
WSW	0	1	2	0	0	0	3
W	1	3	4	0	0	0	8
WNW	0	1	3	2	0	0	6
NW	5	3	4	0	0	0	12
NNW	3	14	39	2	0	0	58
Variable	0	0	0	0	0	0	0
Total	76	104	88	6	0	0	274

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021

Stability Class - Moderately Unstable - 150Ft-33Ft Delta-T (F)

Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	6	10	0	0	0	0	16
NNE	5	6	0	0	0	0	11
NE	4	2	0	0	0	0	6
ENE	5	1	0	0	0	0	6
E	7	2	0	0	0	0	9
ESE	1	5	0	0	0	0	6
SE	2	2	1	0	0	0	5
SSE	1	14	11	0	0	0	26
S	0	15	12	0	0	0	27
SSW	0	2	3	0	0	0	5
SW	0	9	8	1	0	0	18
WSW	0	6	9	0	0	0	15
W	0	5	7	1	0	0	13
WNW	1	4	3	6	0	0	14
NW	2	13	16	7	0	0	38
NNW	0	15	43	10	0	0	68
Variable	0	0	0	0	0	0	0
Total	34	111	113	25	0	0	283

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Slightly Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	2	1	0	0	0	5
NNE	0	6	0	0	0	0	6
NE	1	1	0	0	0	0	2
ENE	7	0	0	0	0	0	7
E	6	0	0	0	0	0	6
ESE	3	2	0	0	0	0	5
SE	0	0	0	0	0	0	0
SSE	0	5	5	0	0	0	10
S	1	6	9	0	0	0	16
SSW	0	2	1	0	0	0	3
SW	0	5	4	0	0	0	9
WSW	0	1	4	0	0	0	5
W	0	4	8	0	0	0	12
WNW	0	4	3	2	0	0	9
NW	0	3	3	4	0	0	10
NNW	1	4	9	5	0	0	19
Variable	0	0	0	0	0	0	0
Total	21	45	47	11	0	0	124

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Neutral - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	14	36	3	0	0	0	53
NNE	11	21	0	0	0	0	32
NE	13	1	0	0	0	0	14
ENE	20	1	0	0	0	0	21
E	19	8	0	0	0	0	27
ESE	10	12	0	0	0	0	22
SE	8	33	10	0	0	0	51
SSE	17	55	14	0	0	0	86
S	20	44	12	0	0	0	76
SSW	7	17	3	0	0	0	27
SW	8	13	10	0	0	0	31
WSW	2	18	4	0	0	0	24
W	2	16	11	0	0	0	29
WNW	7	30	34	3	1	0	75
NW	12	23	47	18	0	0	100
NNW	10	25	14	4	0	0	53
Variable	0	0	0	0	0	0	0
Total	180	353	162	25	1	0	721

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Slightly Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	8	4	0	0	0	0	12
NNE	11	0	0	0	0	0	11
NE	13	2	0	0	0	0	15
ENE	15	1	0	0	0	0	16
E	21	2	0	0	0	0	23
ESE	20	4	0	0	0	0	24
SE	28	6	0	0	0	0	34
SSE	22	29	4	0	0	0	55
S	30	27	8	0	0	0	65
SSW	13	9	0	0	0	0	22
SW	18	8	0	0	0	0	26
WSW	12	26	4	0	0	0	42
W	15	51	1	0	0	0	67
WNW	13	34	3	0	0	0	50
NW	16	21	0	0	0	0	37
NNW	12	8	0	0	0	0	20
Variable	0	0	0	0	0	0	0
Total	267	232	20	0	0	0	519

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Moderately Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	0	0	0	0	0	3
NNE	2	0	0	0	0	0	2
NE	4	0	0	0	0	0	4
ENE	0	0	0	0	0	0	0
E	9	0	0	0	0	0	9
ESE	6	0	0	0	0	0	6
SE	6	0	0	0	0	0	6
SSE	6	0	0	0	0	0	6
S	6	0	0	0	0	0	6
SSW	9	0	0	0	0	0	9
SW	15	1	0	0	0	0	16
WSW	27	20	1	0	0	0	48
W	14	9	1	0	0	0	24
WNW	7	5	0	0	0	0	12
NW	4	2	0	0	0	0	6
NNW	4	0	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	122	37	2	0	0	0	161

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0



Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Extremely Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	0	0	0	0	0	3
NNE	3	0	0	0	0	0	3
NE	2	0	0	0	0	0	2
ENE	10	0	0	0	0	0	10
E	5	0	0	0	0	0	5
ESE	1	0	0	0	0	0	1
SE	6	0	0	0	0	0	6
SSE	2	0	0	0	0	0	2
S	2	0	0	0	0	0	2
SSW	4	0	0	0	0	0	4
SW	23	5	0	0	0	0	28
WSW	15	3	0	0	0	0	18
W	2	3	0	0	0	0	5
WNW	3	0	0	0	0	0	3
NW	2	0	0	0	0	0	2
NNW	6	0	0	0	0	0	6
Variable	0	0	0	0	0	0	0
Total	89	11	0	0	0	0	100

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021

Stability Class - Extremely Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	0	2	0	1	0	0	3
E	0	6	0	0	0	0	6
ESE	0	2	3	0	0	0	5
SE	0	0	2	2	0	0	4
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	12	5	3	0	0	20

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021

Stability Class - Moderately Unstable - 316Ft-33Ft Delta-T (F)

Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	2	0	0	0	0	2
ENE	0	2	3	1	0	0	6
E	0	5	1	0	0	0	6
ESE	0	0	1	0	0	0	1
SE	0	0	6	3	0	0	9
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	10	11	4	0	0	25

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Slightly Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	4	4	0	0	0	8
NNE	0	2	0	0	0	0	2
NE	1	0	0	0	0	0	1
ENE	1	3	4	0	0	0	8
E	1	7	0	0	0	0	8
ESE	0	4	4	0	1	0	9
SE	0	0	3	2	0	0	5
SSE	0	0	3	2	0	0	5
S	0	0	4	4	0	0	8
SSW	0	0	0	1	0	0	1
SW	0	0	0	0	0	0	0
WSW	0	0	0	1	0	0	1
W	0	0	0	6	0	0	6
WNW	0	0	2	0	2	3	7
NW	0	0	3	7	1	1	12
NNW	0	0	14	11	1	0	26
Variable	0	0	0	0	0	0	0
Total	3	20	41	34	5	4	107

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Neutral - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	17	19	9	0	0	48
NNE	2	11	11	7	0	0	31
NE	7	10	17	21	1	0	56
ENE	6	7	20	8	0	0	41
E	1	20	12	5	2	0	40
ESE	1	14	21	11	4	0	51
SE	0	21	32	20	0	0	73
SSE	1	17	36	7	1	0	62
S	3	16	73	59	2	0	153
SSW	0	14	47	4	0	0	65
SW	0	13	24	9	2	1	49
WSW	0	10	17	18	0	0	45
W	2	4	14	22	7	0	49
WNW	0	4	30	24	23	9	90
NW	3	14	36	58	44	15	170
NNW	2	13	65	41	14	2	137
Variable	0	0	0	0	0	0	0
Total	31	205	474	323	100	27	1160

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Slightly Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	6	8	6	1	0	22
NNE	0	5	1	0	0	0	6
NE	1	1	2	0	0	0	4
ENE	2	3	1	0	0	0	6
E	1	3	8	4	0	0	16
ESE	3	8	7	6	0	0	24
SE	4	9	15	0	0	0	28
SSE	5	9	14	7	0	0	35
S	2	27	34	32	6	0	101
SSW	4	13	47	9	3	0	76
SW	6	25	12	6	0	0	49
WSW	0	9	9	7	2	0	27
W	2	10	13	16	4	0	45
WNW	0	7	13	36	4	0	60
NW	0	8	29	44	6	0	87
NNW	1	14	21	7	0	0	43
Variable	0	0	0	0	0	0	0
Total	32	157	234	180	26	0	629

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Moderately Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	2	2	2	0	0	6
NNE	1	1	1	0	0	0	3
NE	0	1	0	0	0	0	1
ENE	0	0	0	0	0	0	0
E	0	0	1	0	0	0	1
ESE	0	1	0	0	0	0	1
SE	2	1	0	0	0	0	3
SSE	2	0	0	0	0	0	2
S	3	8	3	0	0	0	14
SSW	2	8	3	1	0	0	14
SW	2	19	11	3	0	0	35
WSW	0	8	14	1	0	0	23
W	2	7	8	2	3	0	22
WNW	1	6	9	4	1	0	21
NW	1	4	9	6	0	0	20
NNW	1	3	4	4	0	0	12
Variable	0	0	0	0	0	0	0
Total	17	69	65	23	4	0	178

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

Peach Bottom Atomic Power Station

Period of Record: April - June 2021  
Stability Class - Extremely Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	2	1	0	0	0	3
SE	0	0	3	0	0	0	3
SSE	0	0	0	0	0	0	0
S	0	0	2	0	0	0	2
SSW	2	0	1	0	0	0	3
SW	2	9	1	0	0	0	12
WSW	1	1	6	2	0	0	10
W	0	3	5	2	0	0	10
WNW	0	2	1	0	0	0	3
NW	0	1	6	1	0	0	8
NNW	0	0	11	0	0	0	11
Variable	0	0	0	0	0	0	0
Total	5	18	37	5	0	0	65

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0



Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Extremely Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	12	14	0	1	0	0	27
NNE	10	4	0	0	0	0	14
NE	13	1	0	0	0	0	14
ENE	7	0	0	0	0	0	7
E	12	1	0	0	0	0	13
ESE	5	7	0	0	0	0	12
SE	2	11	2	1	0	0	16
SSE	1	11	5	0	0	0	17
S	0	8	7	0	0	0	15
SSW	1	1	4	0	0	0	6
SW	0	0	1	0	0	0	1
WSW	0	1	0	0	0	0	1
W	0	1	1	0	0	0	2
WNW	2	2	3	0	0	0	7
NW	0	5	3	0	0	0	8
NNW	1	9	7	2	0	0	19
Variable	0	0	0	0	0	0	0
Total	66	76	33	4	0	0	179

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Moderately Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	6	10	0	0	0	0	16
NNE	5	2	0	0	0	0	7
NE	6	1	0	0	0	0	7
ENE	8	0	0	0	0	0	8
E	8	2	0	0	0	0	10
ESE	1	1	0	0	0	0	2
SE	2	2	9	0	0	0	13
SSE	1	12	14	0	0	0	27
S	0	11	6	0	0	0	17
SSW	0	6	1	0	0	0	7
SW	1	3	10	0	0	0	14
WSW	2	1	0	0	0	0	3
W	3	7	4	0	0	0	14
WNW	0	11	3	0	0	0	14
NW	0	17	9	0	0	0	26
NNW	4	32	20	1	0	0	57
Variable	0	0	0	0	0	0	0
Total	47	118	76	1	0	0	242

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Slightly Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	3	0	0	0	0	5
NNE	6	0	0	0	0	0	6
NE	1	0	0	0	0	0	1
ENE	8	0	0	0	0	0	8
E	2	0	0	0	0	0	2
ESE	0	0	0	0	0	0	0
SE	1	4	1	0	0	0	6
SSE	3	13	3	0	0	0	19
S	0	4	1	0	0	0	5
SSW	2	3	0	0	0	0	5
SW	0	10	2	0	0	0	12
WSW	0	5	0	0	0	0	5
W	0	8	1	0	0	0	9
WNW	1	4	1	0	0	0	6
NW	2	12	2	0	0	0	16
NNW	3	15	5	0	0	0	23
Variable	0	0	0	0	0	0	0
Total	31	81	16	0	0	0	128

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Nuclear Station

Period of Record: July - September 2021  
Stability Class - Neutral - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	33	16	2	0	0	0	51
NNE	24	2	0	0	0	0	26
NE	16	2	0	0	0	0	18
ENE	15	1	0	0	0	0	16
E	4	0	0	0	0	0	4
ESE	6	5	0	0	0	0	11
SE	13	27	17	7	0	0	64
SSE	12	61	19	0	0	0	92
S	5	24	9	0	0	0	38
SSW	13	12	5	0	0	0	30
SW	12	11	5	0	0	0	28
WSW	9	10	2	0	0	0	21
W	15	20	3	0	0	0	38
WNW	16	24	1	0	0	0	41
NW	11	31	5	0	0	0	47
NNW	20	38	17	1	0	0	76
Variable	0	0	0	0	0	0	0
Total	224	284	85	8	0	0	601

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Slightly Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	17	10	0	0	0	0	27
NNE	16	0	0	0	0	0	16
NE	7	1	0	0	0	0	8
ENE	13	0	0	0	0	0	13
E	18	0	0	0	0	0	18
ESE	14	2	0	0	0	0	16
SE	30	16	0	0	0	0	46
SSE	25	27	2	0	0	0	54
S	44	29	1	0	0	0	74
SSW	28	8	0	1	0	0	37
SW	30	21	3	1	0	0	55
WSW	34	22	0	0	0	0	56
W	35	36	0	0	0	0	71
WNW	46	45	0	0	0	0	91
NW	38	29	0	0	0	0	67
NNW	19	19	1	0	0	0	39
Variable	0	0	0	0	0	0	0
Total	414	265	7	2	0	0	688

Hours of calm in this stability class: 2  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Moderately Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	0	0	0	0	0	1
NNE	1	0	0	0	0	0	1
NE	1	0	0	0	0	0	1
ENE	5	0	0	0	0	0	5
E	5	0	0	0	0	0	5
ESE	2	0	0	0	0	0	2
SE	6	0	0	0	0	0	6
SSE	3	0	0	0	0	0	3
S	2	0	0	0	0	0	2
SSW	15	2	0	0	0	0	17
SW	42	5	0	0	0	0	47
WSW	48	19	1	0	0	0	68
W	28	10	0	0	0	0	38
WNW	21	2	0	0	0	0	23
NW	4	2	0	0	0	0	6
NNW	4	0	0	0	0	0	4
Variable	0	0	0	0	0	0	0
Total	188	40	1	0	0	0	229

Hours of calm in this stability class: 3  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Extremely Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	1	0	0	0	0	0	1
ESE	1	0	0	0	0	0	1
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	3	0	0	0	0	0	3
SSW	4	0	0	0	0	0	4
SW	35	14	0	0	0	0	49
WSW	56	10	0	0	0	0	66
W	5	5	0	0	0	0	10
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	105	29	0	0	0	0	134

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Extremely Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	3	0	0	0	0	3
E	0	3	0	0	0	0	3
ESE	0	1	3	0	0	0	4
SE	0	0	1	0	0	0	1
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	7	4	0	0	0	11

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2



Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Moderately Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	1	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	2	3	2	0	0	0	7
E	1	7	0	0	0	0	8
ESE	0	1	4	0	0	0	5
SE	0	0	3	1	0	0	4
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	3	13	9	1	0	0	26

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Slightly Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	1	0	0	0	4
NNE	0	0	1	0	0	0	1
NE	0	3	0	0	0	0	3
ENE	2	6	2	1	0	0	11
E	0	7	0	0	0	0	7
ESE	0	6	1	0	0	0	7
SE	0	0	6	1	0	0	7
SSE	0	0	1	0	0	0	1
S	0	0	5	3	0	0	8
SSW	0	0	3	2	0	0	5
SW	0	0	0	2	0	0	2
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	1	0	0	0	1
NW	0	0	0	1	0	0	1
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	2	25	21	10	0	0	58

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Atomic Power Station  
Unit 2 and 3

Licensee: Exelon Generation Company, LLC  
PSEG Nuclear, LLC

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Neutral - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	18	16	4	0	0	42
NNE	2	10	8	3	0	0	23
NE	6	19	8	0	0	0	33
ENE	15	13	17	3	0	0	48
E	9	22	5	2	0	0	38
ESE	5	21	11	7	0	0	44
SE	4	16	40	22	14	3	99
SSE	1	13	26	21	2	0	63
S	3	19	52	29	0	0	103
SSW	1	14	21	5	0	0	41
SW	1	12	20	15	0	0	48
WSW	7	6	5	1	0	0	19
W	3	21	21	12	1	0	58
WNW	3	21	29	17	0	0	70
NW	3	37	49	22	3	0	114
NNW	4	38	55	29	11	1	138
Variable	0	0	0	0	0	0	0
Total	71	300	383	192	31	4	981

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Slightly Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	5	11	22	3	1	1	43
NNE	6	18	8	1	0	0	33
NE	3	16	7	1	0	0	27
ENE	7	10	5	0	0	0	22
E	2	17	11	0	0	0	30
ESE	3	12	6	0	0	0	21
SE	6	18	15	5	0	0	44
SSE	5	13	18	4	2	0	42
S	2	22	32	33	3	0	92
SSW	5	14	42	22	1	1	85
SW	4	16	20	10	3	0	53
WSW	4	15	24	20	0	0	63
W	2	18	18	10	0	0	48
WNW	3	4	22	13	5	0	47
NW	4	18	24	28	4	0	78
NNW	5	15	27	13	2	0	62
Variable	0	0	0	0	0	0	0
Total	66	237	301	163	21	2	790

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Moderately Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	9	9	0	0	0	19
NNE	3	0	0	0	0	0	3
NE	1	5	0	0	0	0	6
ENE	1	3	0	0	0	0	4
E	2	0	0	0	0	0	2
ESE	0	0	1	0	0	0	1
SE	1	2	0	0	0	0	3
SSE	4	3	3	0	0	0	10
S	4	5	2	0	0	0	11
SSW	4	7	0	3	0	0	14
SW	8	7	7	1	1	0	24
WSW	0	4	13	12	1	0	30
W	3	5	15	8	0	0	31
WNW	3	8	10	10	0	0	31
NW	3	9	12	8	0	0	32
NNW	6	19	11	3	0	0	39
Variable	0	0	0	0	0	0	0
Total	44	86	83	45	2	0	260

Hours of calm in this stability class: 2  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Power Atomic Station

Period of Record: July - September 2021  
Stability Class - Extremely Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	1	0	0	0	0	0	1
NE	0	1	0	0	0	0	1
ENE	0	1	0	0	0	0	1
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	2	0	0	0	0	0	2
S	1	0	0	0	0	0	1
SSW	5	3	0	0	0	0	8
SW	1	2	2	0	0	0	5
WSW	6	2	5	0	0	0	13
W	2	1	5	0	0	0	8
WNW	3	3	2	0	0	0	8
NW	3	7	6	1	0	0	17
NNW	1	5	6	0	0	0	12
Variable	0	0	0	0	0	0	0
Total	25	25	26	1	0	0	77

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 2

Peach Bottom Atomic Power Station

Period of Record: October - December 2021

Stability Class - Extremely Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	5	4	2	0	0	0	11
NNE	4	5	0	0	0	0	9
NE	7	0	0	0	0	0	7
ENE	10	1	0	0	0	0	11
E	14	4	0	0	0	0	18
ESE	3	2	0	0	0	0	5
SE	1	2	0	0	0	0	3
SSE	0	1	0	0	0	0	1
S	0	1	4	2	0	0	7
SSW	1	0	0	0	0	0	1
SW	2	0	3	0	0	0	5
WSW	1	3	0	0	0	0	4
W	1	3	0	0	0	0	4
WNW	0	0	0	0	0	0	0
NW	4	4	0	0	0	0	8
NNW	3	4	1	0	0	0	8
Variable	0	0	0	0	0	0	0
Total	56	34	10	2	0	0	102

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021

Stability Class - Moderately Unstable - 150Ft-33Ft Delta-T (F)

Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	6	0	0	0	0	7
NNE	5	2	0	0	0	0	7
NE	3	0	0	0	0	0	3
ENE	10	1	0	0	0	0	11
E	9	0	0	0	0	0	9
ESE	3	5	0	0	0	0	8
SE	4	11	4	0	0	0	19
SSE	1	2	2	1	0	0	6
S	1	3	4	0	0	0	8
SSW	1	2	1	0	0	0	4
SW	0	1	1	0	0	0	2
WSW	0	3	0	0	0	0	3
W	0	1	1	0	0	0	2
WNW	0	10	8	0	0	0	18
NW	0	10	12	3	0	0	25
NNW	2	9	8	2	0	0	21
Variable	0	0	0	0	0	0	0
Total	40	66	41	6	0	0	153

Hours of calm in this stability class: 2

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 0



Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Slightly Unstable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	4	3	0	0	0	0	7
NNE	4	0	0	0	0	0	4
NE	5	0	0	0	0	0	5
ENE	8	0	0	0	0	0	8
E	5	0	0	0	0	0	5
ESE	3	0	0	0	0	0	3
SE	1	0	0	0	0	0	1
SSE	2	3	3	0	0	0	8
S	0	2	2	0	0	0	4
SSW	1	5	0	0	0	0	6
SW	0	1	0	0	0	0	1
WSW	0	1	0	0	0	0	1
W	0	2	2	3	0	0	7
WNW	0	6	11	2	0	0	19
NW	1	6	19	6	0	0	32
NNW	1	7	7	2	0	0	17
Variable	0	0	0	0	0	0	0
Total	35	36	44	13	0	0	128

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Neutral - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	29	22	1	0	0	0	52
NNE	25	6	0	0	0	0	31
NE	24	8	0	0	0	0	32
ENE	31	1	0	0	0	0	32
E	31	6	0	0	0	0	37
ESE	18	15	1	0	0	0	34
SE	15	47	10	0	0	0	72
SSE	16	39	7	0	0	0	62
S	17	19	13	3	0	0	52
SSW	3	6	7	1	1	0	18
SW	3	7	1	0	0	0	11
WSW	2	12	2	0	0	0	16
W	12	28	18	3	0	0	61
WNW	14	39	57	15	0	0	125
NW	9	21	57	17	0	0	104
NNW	5	18	27	7	0	0	57
Variable	0	0	0	0	0	0	0
Total	254	294	201	46	1	0	796

Hours of calm in this stability class: 2  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Slightly Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	18	4	1	0	0	0	23
NNE	29	3	0	0	0	0	32
NE	22	0	0	0	0	0	22
ENE	19	0	0	0	0	0	19
E	31	1	0	0	0	0	32
ESE	31	4	0	0	0	0	35
SE	33	18	0	0	0	0	51
SSE	18	12	0	0	0	0	30
S	22	14	1	0	0	0	37
SSW	11	5	0	0	0	0	16
SW	15	11	3	0	0	0	29
WSW	22	55	4	0	0	0	81
W	21	52	6	0	0	0	79
WNW	13	42	5	0	0	0	60
NW	19	18	5	0	0	0	42
NNW	15	10	0	0	0	0	25
Variable	0	0	0	0	0	0	0
Total	339	249	25	0	0	0	613

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Moderately Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	7	1	0	0	0	0	8
NNE	8	0	0	0	0	0	8
NE	3	0	0	0	0	0	3
ENE	6	0	0	0	0	0	6
E	11	0	0	0	0	0	11
ESE	12	2	0	0	0	0	14
SE	8	0	0	0	0	0	8
SSE	7	0	0	0	0	0	7
S	6	0	0	0	0	0	6
SSW	10	1	0	0	0	0	11
SW	19	1	0	0	0	0	20
WSW	42	20	2	0	0	0	64
W	28	11	0	0	0	0	39
WNW	12	2	0	0	0	0	14
NW	8	6	0	0	0	0	14
NNW	6	1	0	0	0	0	7
Variable	0	0	0	0	0	0	0
Total	193	45	2	0	0	0	240

Hours of calm in this stability class: 2  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Extremely Stable - 150Ft-33Ft Delta-T (F)  
Winds Measured at 33 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	2	0	0	0	0	0	2
NNE	3	0	0	0	0	0	3
NE	1	0	0	0	0	0	1
ENE	3	0	0	0	0	1	4
E	8	0	0	0	0	0	8
ESE	4	0	0	0	0	0	4
SE	2	0	0	0	0	0	2
SSE	4	0	0	0	0	0	4
S	5	0	0	0	0	0	5
SSW	7	0	0	0	0	0	7
SW	22	9	0	0	0	0	31
WSW	47	12	0	0	0	0	59
W	18	1	0	0	0	0	19
WNW	8	1	0	0	0	0	9
NW	7	0	0	0	0	0	7
NNW	3	0	0	0	0	0	3
Variable	0	0	0	0	0	0	0
Total	144	23	0	0	0	1	168

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021

Stability Class - Extremely Unstable - 316Ft-33Ft Delta-T (F)

Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	0	0	0	0	0	0
E	0	0	0	0	0	0	0
ESE	0	0	0	0	0	0	0
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Hours of calm in this stability class: 0

Hours of missing wind measurements in this stability class: 0

Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Moderately Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	0	0	0	0	0
NNE	0	0	0	1	0	0	1
NE	0	0	0	0	0	0	0
ENE	0	0	2	0	0	0	2
E	0	1	0	0	0	0	1
ESE	0	2	0	0	0	0	2
SE	0	0	0	0	0	0	0
SSE	0	0	0	0	0	0	0
S	0	0	0	0	0	0	0
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	3	2	1	0	0	6

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Slightly Unstable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	0	2	0	0	0	2
NNE	0	0	0	0	0	0	0
NE	0	0	0	0	0	0	0
ENE	0	2	1	0	0	0	3
E	0	2	0	0	0	0	2
ESE	0	6	0	0	0	0	6
SE	0	1	4	0	0	0	5
SSE	0	0	0	0	0	0	0
S	0	0	0	1	1	0	2
SSW	0	0	0	0	0	0	0
SW	0	0	0	0	0	0	0
WSW	0	0	0	0	0	0	0
W	0	0	0	0	0	0	0
WNW	0	0	0	0	0	0	0
NW	0	0	0	0	0	0	0
NNW	0	0	0	0	0	0	0
Variable	0	0	0	0	0	0	0
Total	0	11	7	1	1	0	20

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0



Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Neutral - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	1	10	12	5	2	0	30
NNE	5	7	14	0	0	0	26
NE	8	11	15	5	0	0	39
ENE	15	17	8	0	0	0	40
E	6	31	9	7	3	3	59
ESE	8	30	12	3	1	0	54
SE	6	25	33	17	2	0	83
SSE	5	17	37	10	0	0	69
S	1	8	30	14	9	1	63
SSW	1	8	17	14	3	1	44
SW	2	6	9	3	1	0	21
WSW	3	4	12	3	0	0	22
W	0	8	23	11	10	1	53
WNW	1	13	38	55	42	20	169
NW	3	6	36	48	50	8	151
NNW	1	18	21	23	16	0	79
Variable	0	0	0	0	0	0	0
Total	66	219	326	218	139	34	1002

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Slightly Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	3	15	11	1	1	0	31
NNE	2	16	6	2	0	0	26
NE	2	13	3	3	0	0	21
ENE	5	16	9	0	0	0	30
E	5	19	8	0	0	3	35
ESE	1	23	9	1	1	0	35
SE	4	21	17	7	0	0	49
SSE	8	26	22	6	2	0	64
S	5	26	42	21	0	0	94
SSW	6	8	34	8	1	0	57
SW	4	8	12	7	3	1	35
WSW	4	10	18	16	0	0	48
W	3	8	14	47	8	1	81
WNW	2	6	24	40	6	0	78
NW	0	4	26	40	7	0	77
NNW	2	4	17	14	4	0	41
Variable	0	0	0	0	0	0	0
Total	56	223	272	213	33	5	802

Hours of calm in this stability class: 1  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Moderately Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	7	16	0	0	0	23
NNE	0	1	5	0	0	0	6
NE	1	1	2	0	0	0	4
ENE	1	2	2	0	0	0	5
E	1	1	7	1	0	1	11
ESE	1	1	4	0	0	0	6
SE	0	1	2	0	0	0	3
SSE	1	3	5	0	0	0	9
S	0	9	3	0	0	0	12
SSW	0	12	5	0	0	0	17
SW	3	12	5	4	0	0	24
WSW	0	8	15	3	1	0	27
W	3	5	12	20	5	0	45
WNW	1	4	18	7	1	0	31
NW	1	10	11	4	0	0	26
NNW	1	4	11	3	0	0	19
Variable	0	0	0	0	0	0	0
Total	14	81	123	42	7	1	268

Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

Peach Bottom Atomic Power Station

Period of Record: October - December 2021  
Stability Class - Extremely Stable - 316Ft-33Ft Delta-T (F)  
Winds Measured at 320 Feet

Wind Direction	Wind Speed (in mph)						Total
	1-3	4-7	8-12	13-18	19-24	> 24	
N	0	3	1	0	0	0	4
NNE	0	7	3	0	0	0	10
NE	0	1	1	0	0	0	2
ENE	0	0	0	0	0	0	0
E	0	0	1	0	0	0	1
ESE	0	0	3	0	0	0	3
SE	0	2	0	0	0	0	2
SSE	0	0	2	0	0	0	2
S	1	2	2	0	0	0	5
SSW	0	3	2	0	0	0	5
SW	1	3	3	0	0	0	7
WSW	3	7	12	1	0	0	23
W	0	4	5	3	0	0	12
WNW	2	4	7	4	0	0	17
NW	3	0	1	2	0	0	6
NNW	0	5	5	0	0	0	10
Variable	0	0	0	0	0	0	0
Total	10	41	48	10	0	0	109



Hours of calm in this stability class: 0  
Hours of missing wind measurements in this stability class: 0  
Hours of missing stability measurements in all stability classes: 0

## Appendix A: ODCM Revision

Offsite Dose Calculation Manual  
Revision 18

Peach Bottom Atomic Power Station  
Units 2 and 3

Exelon Generation Company, LLC  
Docket Nos. 50-277 & 50-278

PORC Approval:  1/7/2021  
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Implemented:  1-7-21

January 2021

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Appendix A	Radioactive Effluents Control Program

## I. Purpose

The purpose of the Offsite Dose Calculation Manual is to establish methodologies and procedures for calculating doses to individuals in areas at and beyond the SITE BOUNDARY due to radioactive effluents from Peach Bottom Atomic Power Station. The results of these calculations are required to determine compliance with the requirements of Specification 5.5.4, "Radioactive Effluent Controls Program" of Appendix A to Operating Licenses DPR-44 and DPR-56, "Technical Specifications for Peach Bottom Atomic Power Station Units No. 2 and 3". The Radioactive Effluents Control Program is located in Appendix A of this Offsite Dose Calculation Manual and contains Offsite Dose Calculation Manual Specifications (ODCMS) and their associated Bases which implement the requirements of Technical Specification 5.5.4.

## II. Setpoint Determination for Liquid & Gaseous Monitors

### II.A Liquid Radwaste Activity Monitor Setpoint

A sketch of the Liquid Radwaste System is presented in Figure 4. Each tank of radioactive waste is sampled prior to release. A small liquid volume of this sample is analyzed for gross gamma activity in a NaI well counter. This NaI well counter activity is then converted to an equivalent liquid radwaste monitor reading.

$$\text{CPS (R/W Monitor)} = [\text{Net CPM/ml (well)} \times \text{Eff W/RW}] + \text{Background CPS}$$

Where:

$$\text{CPS (R/W Monitor)} = \text{liquid radwaste gross activity monitor reading in CPS}$$

$$\text{Net CPM/ml (well)} = \text{gross gamma activity for the radwaste sample tank [determined by the well counter]}$$

$$\text{Eff W/RW} = \text{conversion factor between well counter and liquid radwaste gross activity monitor [determined by calibrating both detectors with the same liquid radioactive source]}$$

$$\text{Background CPS} = \text{background reading of the liquid radwaste gross activity monitor in CPS}$$



Exceeding the expected response would indicate that an incorrect sample had been obtained for that release and the release is automatically stopped.

The alarm and trip pot setpoints for the liquid radwaste activity monitor are determined from a calibration curve for the alarm pot and trip pot. The alarm pot setting includes a factor of 1.25 to allow for analysis error, pot setting error, instrument error and calibration error. The trip pot setting includes a factor of 1.35 to allow for analysis error, pot setting error, instrument error and calibration error.

#### II.B Liquid Radwaste Release Flowrate Setpoint Determination

The trip pot setpoint for the liquid radwaste release flowrate is determined by multiplying the liquid radwaste flowrate (from Section III.A) by 1.2 and using this value on the appropriate calibration curve for the discharge flow meter to be used. The Peach Bottom radwaste system has two flow monitors - high flow (5 to 300 gpm) and low flow (0.8 to 15 gpm). The factor of 1.2 allows for pot setting error and instrument error. The flow rate determination includes a margin of assurance which includes consideration of this error such that the instantaneous release limit of 10 CFR 20 is not exceeded.

#### II.C Setpoint Determination for Gaseous Radwaste

A sketch of the Offgas Radwaste Treatment System is presented in Figure 1. Sketches of the Ventilation Treatment Systems for Units 2 and 3 are presented in Figures 2 and 3 respectively. The high and high-high alarm setpoints for the main stack radiation monitor, Unit 2 roof vent radiation monitor and Unit 3 roof vent radiation monitor are determined as follows:

High Alarm - the high alarm setpoint is set at approximately 3 x background.

High-High Alarm - the high-high alarm setpoint is set at a release rate from this vent of approximately 30% of the instantaneous release limit as specified in ODCMS 3.8.C.1.a for the most restrictive case (skin or total body) on an unidentified basis. To determine these setpoints, solve the gaseous effluent dose rate equations in section IV.A of the ODCM to determine what main stack release rate and roof vent release rate will produce a dose rate of 150 mrem/yr to the total body (30% of the limit of 500 mrem/yr) and a dose rate of 900 mrem/yr to the skin (30% of the limit of 3000 mrem/yr) from each release point. Using the highest (most restrictive) release rate for each release point determine monitor response required to produce this release rate assuming a normal vent flow rate and pressure correction factor. Set the high-high alarm for approximately this monitor response.

#### II.D. Setpoint Determination for Gaseous Radwaste

##### Flow Monitors

The alarm setpoint for the main stack flow monitor is as follows:

Low Flow Alarm - 10,000 CFM. - This setting ensures that the main stack minimum dilution flow as specified in ODCMS 3.8.C.4.a is maintained.

The alarm setpoints for the roof vent flow monitors are as follows:

Low Flow Alarm -  $1.5 \times 10^5$  cfm

High Flow Alarm -  $5.4 \times 10^5$  cfm

#### III. Liquid Pathway Dose Calculations

##### III.A Liquid Radwaste Release Flow Rate Determination

Peach Bottom Atomic Power Station Units 2 and 3 have one common discharge point for liquid releases. The following calculation assures that the radwaste release limits are met.

The flow rate of liquid radwaste released from the site to areas at and beyond the SITE BOUNDARY shall be such that the concentration of radioactive material after dilution shall be limited to 10 times the concentration specified in 10 CFR 20, Appendix B, Table 2, Column 2 for radionuclides other than noble gases and  $2\text{E-}4$   $\mu\text{Ci/ml}$  total activity concentration for all noble gases as specified in ODCMS 3.8.B.1. This

methodology is consistent with the additional guidance the NRC provided to the industry during the implementation of the updated 10 CFR 20 which changed the criterion for controlling release rate based on Effective Concentration (EC) values in the updated 10 CFR 20 as opposed to the Maximum Permissible Concentration (MPC) values in the former 10 CFR 20.

Each tank of radioactive waste is sampled prior to release and is quantitatively analyzed for identifiable gamma emitters as specified in Table 4.8.B.1 of the ODCMS. While non-gamma emitters are not specifically addressed, the conservatisms inherent in the calculation of the maximum permissible release rate are more than adequate to account for them. From this gamma isotopic analysis the maximum permissible release flow rate is determined as follows:

Determine a Dilution Factor by:

$$\text{Dilution Factor} = \sum_i \frac{\mu\text{Ci} / \text{ml}_i}{10 \times \text{ECL}_i} - 1$$

$\mu\text{Ci} / \text{ml}_i$  = the activity of each identified gamma emitter in  $\mu\text{Ci}/\text{ml}$

$\text{ECL}_i$  = The effluent concentration specified in 10 CFR 20, Appendix B, Table 2, Column 2 for radionuclides other than noble gases or  $2 \times 10^{-4} \mu\text{Ci}/\text{ml}$  for noble gases.

Determine the Maximum Permissible Release Rate with this Dilution Factor by:

$$\text{Release Rate (gpm)} = \frac{A \times 2.0 \times 10^5}{B \times C \times \text{Dilution Factor}}$$

A = The number of circulating water pumps running which will provide dilution

$2.0 \times 10^5$  = the flow rate in gpm for each circulating water pump running

B = margin of assurance which includes consideration of the maximum error in the activity setpoint, the maximum error in the flow setpoint, and possible loss of 5 out of the 6 possible circulating water pumps during a release. The value used for B is 10.0.

C = concentration gradient factor. The value used for C is 5.0 for discharge canal water levels less than 104' and 3.0 for canal water levels greater than 104'. This just adds another factor of conservatism.

### III.B ODCMS 4.8.B.2.1

Dose contributions from liquid effluents released to areas at and beyond the SITE BOUNDARY shall be calculated using the equation below. This dose calculation uses those appropriate radionuclides listed in Table III.A.1. These radionuclides account for virtually 100 percent of the total body dose and organ dose from liquid effluents.

The dose for each age group and each organ should be calculated to determine the maximum total body dose and organ dose for each quarter and the year, as appropriate. Cumulative dose files for quarterly and yearly doses should be maintained separately and the maximum total body and organ dose reported in each case. **CM-1** NRC URI 88-33-01, T00353.

$$D_{\tau} = \sum_i \left[ A_{i\tau} \sum_{\ell=1}^m \Delta t_{\ell} C_{i\ell} F_{\ell} \right]$$

where:

$D_{\tau}$  = The cumulative dose commitment to the total body or any organ,  $\tau$ , from liquid effluents for the total

time period  $\sum_{\ell=1}^m \Delta t_{\ell}$ , in mrem.

- $\Delta t_{\ell}$  = The length of the  $\ell$ th time period over which  $C_{i\ell}$  and  $F_{\ell}$  are averaged for the liquid release, in hours.
- $C_{i\ell}$  = The average concentration of radionuclide,  $i$ , in undiluted liquid effluent during time period  $\Delta t_{\ell}$  from any liquid release, (determined by the effluent sampling analysis program, ODCMS Table 4.8.B.1), in  $\mu\text{Ci/ml}$ .
- $A_{i\tau}$  = The site related ingestion dose commitment factor to the total body or organ,  $\tau$ , for each radionuclide listed in Table III.A.1, in mrem-ml per hr- $\mu\text{Ci}$ . See Site Specific Data.\*\*
- $F_{\ell}$  = The near field average dilution factor for  $C_{i\ell}$  during any liquid effluent release. Defined as the ratio of the maximum undiluted liquid waste flow during release to the average flow through the discharge pathway.

### III.C ODCMS 4.8.B.4.1

Projected dose contributions from liquid effluents shall be calculated using the methodology described in section III.B.

\*\* See Note 1 in Bases

TABLE III.A.1

LIQUID EFFLUENT INGESTION DOSE FACTORS  
(DECAY CORRECTED)

$A_{it}$  DOSE FACTOR (MREM-ML PER HR- $\mu$ Ci)

<u>RADIONUCLIDE</u>	<u>TOTAL BODY</u>		
	<u>ADULT</u>	<u>TEEN</u>	<u>CHILD</u>
H-3	2.13E+00	1.53E+00	2.70E+00
NA-24	1.65E+02	1.70E+02	1.98E+02
P-32	5.93E+04	6.49E+04	8.33E+04
CR-51	1.49E+00	1.53E+00	1.69E+00
MN-54	9.82E+02	1.00E+03	1.08E+03
FE-55	1.31E+02	1.40E+02	1.96E+02
FE-59	1.14E+03	1.17E+03	1.36E+03
CO-57	4.55E+01	4.71E+01	5.78E+01
CO-58	2.59E+02	2.62E+02	3.17E+02
CO-60	7.40E+02	7.48E+02	9.07E+02
NI-63	1.29E+03	1.34E+03	1.90E+03
ZN-65	3.87E+04	3.95E+04	4.16E+04
SR-89	8.83E+02	9.45E+02	1.48E+03
SR-90	1.88E+05	1.56E+05	1.72E+05
Y-91M	5.85E-13	6.14E-13	9.31E-13
Y-93	1.27E-03	1.34E-03	2.16E-03
NB-95	1.52E+02	1.56E+02	1.68E+02
NB-95M	no data	no data	no data
ZR-95	1.77E-01	1.72E-01	3.48E-01
ZR-97	1.56E-03	1.56E-03	3.43E-03
MO-99	2.91E+01	3.01E+01	5.53E+01
TC-99M	3.33E-02	3.33E-02	4.93E-02
RU-103	3.57E+00	3.60E+00	5.97E+00
RU-105	6.55E-03	6.72E-03	1.19E-02
AG-110M	2.13E+00	2.04E+00	4.23E+00
SN-113	no data	no data	no data
TE-129M	2.01E+03	2.17E+03	2.79E+03
TE-131M	4.57E+02	4.81E+02	5.74E+02
TE-132	1.40E+03	1.44E+03	1.65E+03
SB-124	2.27E+01	2.18E+01	5.15E+01
SB-125	8.79E+00	8.47E+00	2.01E+01
I-131	1.86E+02	1.79E+02	2.36E+02
I-133	1.97E+01	2.03E+01	3.20E+01
I-135	2.04E+00	2.06E+00	3.12E+00
CS-134	6.74E+05	3.88E+05	1.49E+05
CS-136	9.79E+04	9.15E+04	7.30E+04
CS-137	3.98E+05	2.20E+05	8.49E+04
CS-138	1.04E-11	1.09E-11	1.27E-11
BA-139	5.01E-07	5.17E-07	1.18E-06
BA-140	3.66E+01	3.62E+01	7.42E+01

LA-140	1.92E-02	1.97E-02	2.78E-02
LA-142	3.62E-08	3.70E-08	5.28E-08
CE-141	1.45E-02	1.46E-02	3.86E-02
CE-143	1.68E-03	1.69E-03	4.44E-03

NOTE: The listed dose factors are for radionuclides that may be detected in liquid effluents and have significant dose consequences. The factors are decayed for one day to account for the time between effluent release and ingestion of fish by the maximum exposed individual.

TABLE III.A.1  
LIQUID EFFLUENT INGESTION DOSE FACTORS  
(DECAY CORRECTED)

$A_{it}$  DOSE FACTOR (MREM-ML PER HR- $\mu$ Ci)

<u>RADIONUCLIDE</u>	<u>LIVER</u>		
	<u>ADULT</u>	<u>TEEN</u>	<u>CHILD</u>
H-3	2.13E+00	1.53E+00	2.70E+00
NA-24	1.65E+02	1.70E+02	1.98E+02
P-32	9.55E+04	1.04E+05	1.01E+05
CR-51	no data	no data	no data
MN-54	5.15E+03	5.06E+03	4.03E+03
FE-55	5.62E+02	6.01E+02	6.33E+02
FE-59	2.96E+03	3.02E+03	2.73E+03
CO-57	2.74E+01	2.81E+01	2.86E+01
CO-58	1.16E+02	1.14E+02	1.04E+02
CO-60	3.35E+02	3.32E+02	3.07E+02
NI-63	2.66E+03	2.80E+03	2.99E+03
ZN-65	8.55E+04	8.46E+04	6.69E+04
SR-89	no data	no data	no data
SR-90	no data	no data	no data
Y-91M	no data	no data	no data
Y-93	no data	no data	no data
NB-95	2.83E+02	2.84E+02	2.35E+02
NB-95M	no data	no data	no data
ZR-95	2.61E-01	2.50E-01	3.91E-01
ZR-97	3.40E-03	3.39E-03	5.82E-03
MO-99	1.53E+02	1.58E+02	2.23E+02
TC-99M	2.61E-03	2.57E-03	2.98E-03
RU-103	no data	no data	no data
RU-105	no data	no data	no data
AG-110M	3.58E+00	3.36E+00	5.30E+00
SN-113	no data	no data	no data
TE-129M	4.74E+03	5.09E+03	5.02E+03
TE-131M	5.48E+02	5.77E+02	5.40E+02
TE-132	1.48E+03	1.53E+03	1.36E+03
SB-124	1.08E+00	1.03E+00	1.91E+00
SB-125	4.13E+01	3.96E-01	7.39E-01
I-131	3.25E+02	3.32E+02	4.16E+02
I-133	6.48E+01	6.66E+01	8.45E+01
I-135	5.52E+00	5.55E+00	1.63E+00
CS-134	8.25E+05	8.36E+05	7.06E+05
CS-136	1.36E+05	1.36E+05	1.13E+05
CS-137	6.07E+05	6.32E+05	5.75E+05
CS-138	2.10E-11	2.18E-11	2.01E-11
BA-139	1.22E-08	1.25E-08	2.17E-08
BA-140	7.00E-01	6.90E-01	1.11E+00



LA-140	7.28E-02	7.40E-02	8.25E-02
LA-142	1.45E-07	1.49E-07	1.69E-07
CE-141	1.28E-01	1.27E-01	2.60E-01
CE-143	1.52E+01	1.51E+01	3.07E+01

NOTE: The listed dose factors are for radionuclides that may be detected in liquid effluents and have significant dose consequences. The factors are decayed for one day to account for the time between effluent release and ingestion of fish by the maximum exposed individual.

TABLE III.A.1

LIQUID EFFLUENT INGESTION DOSE FACTORS  
(DECAY CORRECTED)

$A_{it}$  DOSE FACTOR (MREM-ML PER HR- $\mu$ Ci)

<u>RADIONUCLIDE</u>	<u>BONE</u>		
	<u>ADULT</u>	<u>TEEN</u>	<u>CHILD</u>
H-3	no data	no data	no data
NA-24	1.65E+02	1.70E+02	1.98E+02
P-32	2.38E+05	2.58E+05	3.35E+05
CR-51	no data	no data	no data
MN-54	no data	no data	no data
FE-55	8.12E+02	8.47E+02	1.19E+03
FE-59	1.26E+03	1.30E+03	1.68E+03
CO-57	no data	no data	no data
CO-58	no data	no data	no data
CO-60	no data	no data	no data
NI-63	3.84E+04	3.97E+04	5.58E+04
ZN-65	2.69E+04	2.43E+04	2.51E+04
SR-89	3.08E+04	3.30E+04	5.19E+04
SR-90	7.67E+05	6.31E+05	6.78E+05
Y-91M	1.51E-11	1.61E-11	2.57E-11
Y-93	4.58E-02	4.90E-02	7.77E-02
NB-95	5.08E+02	5.12E+02	6.04E+02
NB-95M	no data	no data	no data
ZR-95	8.13E-01	7.94E-01	1.78E+00
ZR-97	1.69E-02	1.71E-02	4.03E-02
MO-99	no data	no data	no data
TC-99M	9.24E-04	9.22E-04	1.52E-03
RU-103	8.30E+00	8.43E+00	1.55E+01
RU-105	1.66E-02	1.73E-02	3.29E-02
AG-110M	3.87E+00	3.55E+00	7.84E+00
SN-113	no data	no data	no data
TE-129M	1.27E+04	1.37E+04	1.80E+04
TE-131M	1.12E+03	1.21E+03	1.56E+03
TE-132	2.29E+03	2.42E+03	3.07E+03
SB-124	5.72E+01	5.59E+01	1.47E+02
SB-125	3.69E+01	3.62E+01	9.59E+01
I-131	2.28E+02	2.38E+02	4.13E+02
I-133	3.72E+01	3.92E+01	6.84E+01
I-135	2.11E+00	2.16E+00	3.66E+00
CS-134	3.47E+05	3.55E+05	4.30E+05
CS-136	3.45E+04	3.46E+04	4.10E+04
CS-137	4.44E+05	4.75E+05	6.01E+05
CS-138	1.06E-11	1.14E-11	1.45E-11
BA-139	1.71E-05	1.77E-05	4.07E-05
BA-140	5.57E+02	5.63E+02	1.27E+03

LA-140	1.44E-01	1.51E-01	2.36E-01
LA-142	3.19E-07	3.35E-07	5.29E-07
CE-141	1.89E-01	1.90E-01	5.21E-01
CE-143	2.06E-02	2.07E-02	5.66E-02

NOTE: The listed dose factors are for radionuclides that may be detected in liquid effluents and have significant dose consequences. The factors are decayed for one day to account for the time between effluent release and ingestion of fish by the maximum exposed individual.

TABLE III.A.1

LIQUID EFFLUENT INGESTION DOSE FACTORS  
(DECAY CORRECTED)

A<sub>it</sub> DOSE FACTOR (MREM-ML PER HR- $\mu$ Ci)

<u>RADIONUCLIDE</u>	<u>KIDNEY</u>		
	<u>ADULT</u>	<u>TEEN</u>	<u>CHILD</u>
H-3	2.13E+00	1.53E+00	2.70E+00
NA-24	1.65E+02	1.70E+02	1.98E+02
P-32	no data	no data	no data
CR-51	3.28E-01	3.35E-01	2.57E-01
MN-54	1.53E+03	1.51E+03	1.13E+03
FE-55	no data	no data	no data
FE-59	no data	no data	no data
CO-57	no data	no data	no data
CO-58	no data	no data	no data
CO-60	no data	no data	no data
NI-63	no data	no data	no data
ZN-65	5.72E+04	5.41E+04	4.22E+04
SR-89	no data	no data	no data
SR-90	no data	no data	no data
Y-91M	no data	no data	no data
Y-93	no data	no data	no data
NB-95	2.79E+02	2.75E+02	2.21E+02
NB-95M	no data	no data	no data
ZR-95	4.09E-01	3.68E-01	5.60E-01
ZR-97	5.14E-03	5.14E-03	8.35E-03
MO-99	3.46E+02	3.61E+02	4.77E+02
TC-99M	3.96E-02	3.83E-02	4.33E-02
RU-103	3.17E+01	2.97E+01	3.91E+01
RU-105	2.14E-01	2.18E-01	2.89E-01
AG-110M	7.04E+00	6.40E+00	9.86E+00
SN-113	no data	no data	no data
TE-129M	5.31E+04	5.74E+04	5.29E+04
TE-131M	5.55E+03	6.01E+03	5.22E+03
TE-132	1.43E+04	1.47E+04	1.27E+04
SB-124	no data	no data	no data
SB-125	no data	no data	no data
I-131	5.57E+02	5.73E+02	6.82E+02
I-133	1.12E+02	1.16E+02	1.41E+02
I-135	8.86E+00	8.77E+00	1.01E+01
CS-134	2.67E+05	2.66E+05	2.19E+05
CS-136	7.57E+04	7.42E+04	6.00E+04
CS-137	2.06E+05	2.15E+05	1.87E+05
CS-138	1.54E-11	1.61E-11	1.41E-11
BA-139	1.14E-08	1.18E-08	1.90E-08
BA-140	2.38E-01	2.34E-01	3.62E-01

LA-140	no data	no data	no data
LA-142	no data	no data	no data
CE-141	5.94E-02	5.98E-02	1.14E-01
CE-143	6.70E-03	6.77E-03	1.29E-02

NOTE: The listed dose factors are for radionuclides that may be detected in liquid effluents and have significant dose consequences. The factors are decayed for one day to account for the time between effluent release and ingestion of fish by the maximum exposed individual.

TABLE III.A.1

LIQUID EFFLUENT INGESTION DOSE FACTORS  
(DECAY CORRECTED)

A<sub>it</sub> DOSE FACTOR (MREM-ML PER HR-μCi)

<u>RADIONUCLIDE</u>	<u>GI-LLI</u>		
	<u>ADULT</u>	<u>TEEN</u>	<u>CHILD</u>
H-3	2.13E+00	1.53E+00	2.70E+00
NA-24	1.65E+02	1.70E+02	1.98E+02
P-32	1.73E+05	1.41E+05	5.98E+04
CR-51	3.74E+02	2.57E+02	8.98E+01
MN-54	1.58E+04	1.04E+04	3.38E+03
FE-55	3.22E+02	2.60E+02	1.17E+02
FE-59	9.90E+03	7.15E+03	2.84E+03
CO-57	6.94E+02	5.24E+02	2.34E+02
CO-58	2.35E+03	1.56E+03	6.04E+02
CO-60	6.30E+03	4.33E+03	1.70E+03
NI-63	5.56E+02	4.46E+02	2.01E+02
ZN-65	5.38E+04	3.58E+04	1.18E+04
SR-89	4.94E+03	3.93E+03	2.01E+03
SR-90	2.22E+04	1.77E+04	9.13E+03
Y-91M	4.44E-11	7.58E-10	5.03E-08
Y-93	1.45E+03	1.50E+03	1.18E+03
NB-95	1.72E+06	1.21E+06	4.35E+05
NB-95M	no data	no data	no data
ZR-95	8.27E+02	5.78E+02	4.08E+02
ZR-97	1.06E+03	9.19E+02	8.81E+02
MO-99	3.54E+02	2.82E+02	1.85E+02
TC-99M	1.54E+00	1.69E+00	1.69E+00
RU-103	9.69E+02	7.04E+02	4.01E+02
RU-105	1.01E+01	1.40E+01	2.15E+01
AG-110M	1.46E+03	9.43E+02	6.30E+02
SN-113	no data	no data	no data
TE-129M	6.40E+04	5.15E+04	2.19E+04
TE-131M	5.44E+04	4.63E+04	2.19E+04
TE-132	7.02E+04	4.85E+04	1.37E+04
SB-124	1.62E+03	1.13E+03	9.19E+02
SB-125	4.07E+02	2.82E+02	2.29E+02
I-131	8.58E+01	6.57E+01	3.70E+01
I-133	5.82E+01	5.03E+01	3.40E+01
I-135	6.24E+00	6.16E+00	5.03E+00
CS-134	1.44E+04	1.04E+04	3.80E+03
CS-136	1.55E+04	1.09E+04	3.96E+03
CS-137	1.18E+04	9.00E+03	3.60E+03
CS-138	8.94E-17	9.90E-15	9.25E-12
BA-139	3.04E-05	1.58E-04	2.35E-03
BA-140	1.15E+03	8.69E+02	6.43E+02

LA-140	5.34E+03	4.25E+03	2.30E+03
LA-142	1.06E-03	4.52E-03	3.34E-02
CE-141	4.89E+02	3.63E+02	3.24E+02
CE-143	5.69E+02	4.54E+02	4.49E+02

NOTE: The listed dose factors are for radionuclides that may be detected in liquid effluents and have significant dose consequences. The factors are decayed for one day to account for the time between effluent release and ingestion of fish by the maximum exposed individual.

#### IV. Gaseous Pathway Dose Calculations

##### IV.A. ODCMS 4.8.C.1.1 and 4.8.C.1.2

The dose rate in areas at and beyond the SITE BOUNDARY due to radioactive materials released in gaseous effluents shall be determined by the expressions below:

##### IV.A.1 Noble Gases:

The dose rate from radioactive noble gas releases shall be determined by either of two methods. Method (a), the Gross Release Method, assumes that all noble gases released are the most limiting nuclide - Kr-88 for total body dose (vent and stack releases) and skin dose (vent releases) and Kr-87 for skin dose (stack releases). Method (b), the Isotopic Analysis Method, utilizes the results of noble gas analyses required by ODCMS 4.8.C.1.1.

##### a. Gross Release Method

$$D_{TB} = V \dot{Q}_{NS} + K \left( \overline{\chi/Q} \right)_V \dot{Q}_{NV}$$

$$D_S = \left[ L_S \left( \overline{\chi/Q} \right)_S + 1.1B \right] \dot{Q}_{NS} + \left[ L_V + 1.1M \right] \left( \overline{\chi/Q} \right)_V \dot{Q}_{NV}$$

where:

The location is the site boundary, 1100m SSE from the vents. This location results in the highest calculated dose to an individual from noble gas releases.

$D_{TB}$  = total body dose rate, in mrem/yr.

$D_S$  = skin dose rate, in mrem/yr.

$V$  =  $4.72 \times 10^{-4}$  mrem/yr per  $\mu\text{Ci/sec}$ ; the constant for Kr-88 accounting for the gamma radiation from the elevated finite plume. This constant was developed using MARE program with plant specific inputs for PBAPS.



## IV.A.1.a (Cont'd)

- $\dot{Q}_{NS}$  = The gross release rate of noble gases from the stack determined by gross activity stack monitors averaged over one hour, in  $\mu\text{Ci/sec}$ .
- $K$  =  $1.47 \times 10^4$  mrem/yr per  $\mu\text{Ci/m}^3$ ; the total body dose factor due to gamma emissions for Kr-88 (Reg. Guide 1.109, Table B-1).
- $(\overline{\chi/Q})_v$  =  $1.12 \times 10^{-6}$  sec/ $\text{m}^3$ ; the highest calculated annual average relative concentration for any area at or beyond the SITE BOUNDARY for all vent releases.
- $\dot{Q}_{NV}$  = The gross release rate of noble gases in gaseous effluents from vent releases determined by gross activity vent monitors averaged over one hour, in  $\mu\text{Ci/sec}$ .
- $L_v$  =  $2.37 \times 10^3$  mrem/yr per  $\mu\text{Ci/m}^3$ ; the skin dose factor due to beta emissions for Kr-88. (Reg. Guide 1.109, Table B-1).
- $L_s$  =  $9.73 \times 10^3$  mrem/yr per  $\mu\text{Ci/m}^3$ ; the skin dose factor due to beta emissions for Kr-87. (Reg. Guide 1.109, Table B-1).
- $(\overline{\chi/Q})_s$  =  $9.97 \times 10^{-8}$  sec/ $\text{m}^3$ ; the highest calculated annual average relative concentration from the stack releases for any area at or beyond the SITE BOUNDARY.
- $B$  =  $1.74 \times 10^{-4}$  mrad/yr per  $\mu\text{Ci/sec}$ ; the constant for Kr-87 accounting for the gamma radiation from the elevated finite plume. This constant was developed using MARE program with plant specific inputs for PBAPS.
- $M$  =  $1.52 \times 10^4$  mrad/yr per  $\mu\text{Ci/m}^3$ ; the air dose factor due to gamma emissions for Kr-88. (Reg. Guide 1.109, Table B-1).
- 1.1 = Unit conversion, converts air dose to skin dose, mrem/mrad.

## IV.A.1. b. Isotopic Analysis Method

$$D_{TB} = \sum_i \left( V_i \dot{Q}_{is} + K_i (\overline{\chi/Q})_v \dot{Q}_{iv} \right)$$

$$D_s = \sum_i \left[ (L_i (\overline{\chi/Q})_s + 1.1B_i) Q_{is} + (L_i + 1.1M_i) (\overline{\chi/Q})_v Q_{iv} \right]$$

where:

The location is the site boundary, 1100m SSE from the vents. This location results in the highest calculated dose to an individual from noble gas releases.

$D_{TB}$  = total body dose rate, in mrem/yr.

$D_s$  = skin dose rate, in mrem/yr.

$V_i$  = The constant for each identified noble gas radionuclide for the gamma radiation from the elevated finite plume. The constants were developed using the MARE program with plant specific inputs for PBAPS. Values are listed on Table IV.A.1, in mrem/yr per  $\mu\text{Ci/sec}$ .

$\dot{Q}_{is}$  = The release rate of noble gas radionuclide,  $i$ , in gaseous effluents from the stack determined by isotopic analysis averaged over one hour, in  $\mu\text{Ci/sec}$ .

$K_i$  = The total body dose factor due to gamma emissions for each identified noble gas radionuclide. Values are listed on Table IV.A.1, in mrem/yr per  $\mu\text{Ci/m}^3$ .

$(\overline{\chi/Q})_v$  =  $1.12 \times 10^{-6} \text{ sec/m}^3$ ; the highest calculated annual average relative concentration for any area at or beyond the SITE BOUNDARY for all vent releases.

$\dot{Q}_{iv}$  = The release rate of noble gas radionuclide,  $i$ , in gaseous effluents from all vent releases determined by isotopic analysis averaged over one hour, in  $\mu\text{Ci}/\text{sec}$ .

#### IV.A.1.b (Cont'd)

$L_i$  = The skin dose factor due to beta emissions for each identified noble gas radionuclide. Values are listed on Table IV.A.1, in  $\text{mrem}/\text{yr}$  per  $\mu\text{Ci}/\text{m}^3$ .

$(\overline{\chi/Q})_s$  =  $9.97 \times 10^{-8} \text{ sec}/\text{m}^3$ ; the highest calculated annual average relative concentration from the stack releases for any area at or beyond the SITE BOUNDARY.

$B_i$  = The constant for each identified noble gas radionuclide accounting for the gamma radiation from the elevated finite plume. The constants were developed using MARE program with plant specific inputs for PBAPS. Values are listed on Table IV.A.1, in  $\text{mrad}/\text{yr}$  per  $\mu\text{Ci}/\text{sec}$ .

$M_i$  = The air dose factor due to gamma emissions for each identified noble gas radionuclide. Values are listed on Table IV.A.1, in  $\text{mrad}/\text{yr}$  per  $\mu\text{Ci}/\text{m}^3$ .

1.1 = Unit conversion, converts air dose to skin dose,  $\text{mrem}/\text{mrad}$ .

TABLE IV.A.1 - Constants for Isotopic Analysis Method  
(corrected for decay during transit)

Radionuclide	Plume-Air Dose Factor $B_i$ (mrad/yr per $\mu\text{Ci/sec}$ )	Total Body Dose Factor $K_i$ (mrem/yr per $\mu\text{Ci/m}^3$ )	Skin Dose Factor $L_i$ (mrem/yr per $\mu\text{Ci/m}^3$ )	Gamma Air Dose Factor $M_i$ (mrad/yr per $\mu\text{Ci/m}^3$ )	Beta Air Dose Factor $N_i$ (mrad/yr per $\mu\text{Ci/m}^3$ )	Plume-Body Dose Factor $V_i$ (mrem/yr per $\mu\text{Ci/sec}$ )
Kr-85m	4.02E-05	1.17E+03	1.46E+03	1.23E+03	1.97E+03	3.76E-05
Kr-87	1.74E-04	5.92E+03	9.73E+03	6.17E+03	1.03E+04	1.66E-04
Kr-88	4.90E-04	1.47E+04	2.37E+03	1.52E+04	2.93E+03	4.72E-04
Xe-133	1.19E-05	2.94E+02	3.06E+02	3.53E+02	1.05E+03	1.11E-05
Xe-133m	1.09E-05	2.51E+02	9.94E+02	3.27E+02	1.48E+03	1.01E-05
Xe-135	6.37E-05	1.81E+03	1.86E+03	1.92E+03	2.46E+03	5.95E-05
Xe-135m	6.61E-05	2.53E+03	5.76E+02	2.72E+03	5.99E+02	6.17E-05
Xe-138	1.52E-04	6.98E+03	3.26E+03	7.28E+03	3.75E+03	1.46E-04

The values  $K_i$ ,  $L_i$ ,  $M_i$ , and  $N_i$  are taken from Reg. Guide 1.109, Table B-1. The values  $B_i$  and  $V_i$  were developed using the MARE program with plant specific inputs for PBAPS.

IV.A.2 Iodine-131, iodine-133, tritium and radioactive materials in particulate form, other than noble gases, with half-lives greater than eight days:

The dose rate shall be determined for either of two critical organs and most restrictive age group. Child thyroid dose is limiting when iodine releases exceed 10 percent of the total release rates. The teenager lung dose is limiting when iodine is either not present or a small fraction of the total release.

When it is not clear which organ dose will be limiting, doses for both restrictive age group organs will be calculated and the limiting organ dose identified.

$$D = \sum_i P_i [W_s \dot{Q}_{is} + W_v \dot{Q}_{iv} + W_v \dot{q}_{iv}]$$

where:

The location is the site boundary, 1100m SSE from the vents.

$D$  = dose rate to the critical organ most restrictive age group, in mrem/yr.

$P_i$  = The dose parameter for radionuclides other than noble gases for the inhalation pathway. The dose factors are based on the critical organ, and most restrictive age group. All values are from Reg. Guide 1.109 (Tables E-5, E-8, E-9 and E-10). Values are listed on Table IV.A.2, in mrem/yr per  $\mu\text{Ci}/\text{m}^3$

$W_s$  =  $1.09 \times 10^{-8} \text{ sec}/\text{m}^3$ ; the highest calculated annual average relative concentration for any area at or beyond the SITE BOUNDARY from stack releases. (SSE boundary)

$\dot{Q}_{is}$  = The release rate of radionuclides;  $i$ , in gaseous effluents from the stack determined by the effluent sampling and analysis program (ODCMS Table 4.8.C.1) in  $\mu\text{Ci}/\text{sec}$ .

$W_v$  =  $1.32 \times 10^{-6} \text{ sec}/\text{m}^3$ ; the highest calculated annual average relative concentration for any area at or beyond the SITE BOUNDARY

IV.A.2. (Cont'd)

$\dot{Q}_{iv}$  = The release rate of radionuclide,  $i$ , in gaseous effluents from all vent releases, determined by the effluent sampling and analysis program (ODCMS Table 4.8.C.1) in  $\mu\text{Ci/sec}$ .

$\dot{q}_{iv}$  = The release rate of radionuclide,  $i$ , in gaseous effluents from abnormal release sources.

TABLE IV.A.2  
Pi CONSTANTS FOR CRITICAL ORGAN FOR THE  
MOST RESTRICTIVE AGE GROUP

(mrem/yr per  $\mu\text{Ci}/\text{m}^3$ )

RADIONUCLIDE	INFANT THYROID DOSE FACTOR	INFANT LUNG DOSE FACTOR	CHILD THYROID DOSE FACTOR	TEENAGER LUNG DOSE FACTOR
H-3	6.47E+02	6.47E+02	1.13E+03	1.27E+03
C-14	5.31E+03	5.31E+03	6.73E+03	4.87E+03
NA-24	1.06E+04	1.06E+04	1.61E+04	1.38E+04
P-32	no data	no data	no data	no data
Cr-51	5.75E+01	1.28E+04	8.55+01	2.10E+04
MN-54	no data	1.00E+06	no data	1.98E+06
FE-55	no data	8.69E+04	no data	1.24E+05
MN-56	no data	1.25E+04	no data	1.52E+04
CO-58	no data	7.77E+05	no data	1.34E+06
FE-59	no data	1.02E+06	no data	1.53E+06
CO-60	no data	4.51E+06	no data	8.72E+06
NI-63	no data	2.09E+05	no data	3.07E+05
CU-64	no data	9.30E+03	no data	1.11E+04
NI-65	no data	8.12E+03	no data	9.36E+03
ZN-65	no data	6.47E+05	no data	1.24E+06
ZN-69	no data	1.47E+03	no data	1.58E+03
BR-83	no data	no data	no data	no data
BR-84	no data	no data	no data	no data
BR-85	no data	no data	no data	no data
RB-86	no data	no data	no data	no data
RB-88	no data	no data	no data	no data
RB-89	no data	no data	no data	no data
SR-89	no data	2.03E+06	no data	2.42E+06
SR-90	no data	1.12E+07	no data	1.65E+07
Y-90	no data	2.69E+05	no data	2.93E+05
SR-91	no data	5.26E+04	no data	6.07E+04
Y-91M	no data	2.79E+03	no data	3.20E+03
Y-91	no data	2.45E+06	no data	2.94E+06
SR-92	no data	2.38E+04	no data	2.74E+04
Y-92	no data	2.45E+04	no data	2.68E+04
Y-93	no data	7.64E+04	no data	8.32E+04
NB-95	no data	4.79E+05	no data	7.51E+05
ZR-95	no data	1.75E+06	no data	2.69E+06
ZR-97	no data	1.10E+05	no data	1.30E+05
MO-99	no data	1.35E+05	no data	1.54E+05
TC-99M	no data	8.11E+02	no data	1.15E+03
TC-101	no data	5.84E+02	no data	6.67E+02

RU-103	no data	5.52E+05	no data	7.83E+05
RU-105	no data	1.57E+04	no data	1.82E+04
RU-106	no data	1.16E+07	no data	1.61E+07
AG-110M	no data	3.67E+06	no data	6.75E+06
TE-125M	1.62E+03	4.47E+05	1.92E+03	5.36E+05
TE-127M	4.87E+03	1.31E+06	6.07E+03	1.66E+06
TE-127	1.85E+00	1.04E+04	1.96E+00	1.12E+04
TE-129M	5.47E+03	1.68E+06	6.33E+03	1.98E+06
TE-129	6.75E-02	3.00E+03	7.14E-02	3.30E+03
I-130	1.60E+06	no data	1.85E+06	no data
I-131	1.48E+07	no data	1.62E+07	no data
TE-131M	8.93E+01	1.99E+05	9.77E+01	2.38E+05
TE-131	1.58E-02	2.06E+03	1.70E-02	2.34E+03
I-132	1.69E+05	no data	1.94E+05	no data
TE-132	2.79E+02	3.40E+05	3.18E+02	4.49E+05
I-133	3.56E+06	no data	3.85E+06	0.00E+00
CS-134	no data	7.97E+04	0.00E+00	1.46E+05
I-134	4.45E+04	no data	5.07E+04	no data
I-135	6.96E+05	no data	7.92E+05	no data
CS-136	no data	1.18E+04	no data	1.78E+04
CS-137	no data	7.13E+04	no data	1.21E+05
CS-138	no data	6.54E+01	no data	7.87E+01
BA-139	no data	5.95E+03	no data	6.46E+03
BA-140	no data	1.60E+06	no data	2.03E+06
LA-140	no data	1.68E+05	no data	2.14E+05
BA-141	no data	2.97E+03	no data	3.29E+03
CE-141	no data	5.17E+05	no data	6.14E+05
BA-142	no data	1.55E+03	no data	1.91E+03
LA-142	no data	8.22E+03	no data	1.02E+04
CE-143	no data	1.16E+05	no data	1.30E+05
PR-143	no data	4.33E+05	no data	4.83E+05
CE-144	no data	9.84E+06	no data	1.34E+07
PR-144	no data	1.61E+03	no data	1.75E+03
ND-147	no data	3.22E+05	no data	3.72E+05
W-187	no data	3.96E+04	no data	4.74E+04
NP-239	no data	5.95E+04	no data	6.49E+04



IV.B. ODCMS 4.8.C.2.1

The air dose in areas at and beyond the SITE BOUNDARY due to noble gases released in gaseous effluents shall be determined by the expressions below.

The air dose shall be determined by either of two methods. Method (a), the Gross Release Method, assumes that all noble gases released are the most limiting nuclide - Kr-88 for gamma radiation and Kr-87 for beta radiation. Method (b), the Isotopic Analysis Method, utilizes the results of noble gas analyses required by ODCMS 4.8.C.1.1.

## IV.B.1 for gamma radiation:

## a. Gross Release Method

$$D_{\gamma} = 3.17 \times 10^{-8} \left[ M (\chi/Q)_{\gamma} \tilde{Q}_v + B \tilde{Q}_s \right]$$

where:

The location is the SITE BOUNDARY 1100m SSE from the vents. This location results in the highest calculated gamma air dose from noble gas releases.

$D_{\gamma}$  = gamma air dose, in mrad.

$3.17 \times 10^{-8}$  = years per second.

$M$  =  $1.52 \times 10^4$  mrad/yr per  $\mu\text{Ci}/\text{m}^3$ ; the air dose factor due to gamma emissions for Kr-88. (Reg. Guide 1.109, Table B-1)

$(\chi/Q)_{\gamma}$  =  $1.12 \times 10^{-6}$  sec/ $\text{m}^3$ ; the highest calculated annual average relative concentration from vent releases for any area at or beyond the SITE BOUNDARY.

$\tilde{Q}_v$  = The gross release of noble gas radionuclides in gaseous effluents from all vents, determined by gross activity vent monitors, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year as appropriate.

## IV.B.1. a (Cont'd)

B =  $4.90 \times 10^{-4}$  mrad/year per  $\mu\text{Ci}/\text{sec}$ ; the constant for Kr-88 accounting for the gamma radiation from the elevated finite plume.

The constant was developed using the MARE program with plant specific inputs for PBAPS.

$\tilde{Q}_s$  = The gross release of noble gas radionuclides in gaseous releases from the stack determined by gross activity stack monitor in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year as appropriate.

## b. Isotopic Analysis Method

$$D_\gamma = 3.17 \times 10^{-8} \sum_i [M_i (\chi/Q)_v \tilde{Q}_{iv} + B_i \tilde{Q}_{is}]$$

where:

i

The location is the SITE BOUNDARY, 1100m SSE from the vents. This location results in the highest calculated gamma air dose from noble gas releases.

$D_\gamma$  = gamma air dose, in mrad.

$3.17 \times 10^{-8}$  = years per second.

$M_i$  = The air dose factor due to gamma emissions for each identified noble gas radionuclide. Values are listed on Table IV.A.1, in mrad/yr per  $\mu\text{Ci}/\text{m}^3$ .

$(\overline{\chi/Q})_v$  =  $1.12 \times 10^{-6}$  sec/ $\text{m}^3$ ; the highest calculated average relative concentration from vent releases for any area at or beyond the SITE BOUNDARY.

$\tilde{Q}_{iv}$  = The release of noble gas radionuclides, i, in gaseous effluents from all vents as determined by isotopic analysis, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

$B_i$  = The constant for each identified noble gas radionuclide accounting for the gamma radiation for the elevated finite plume. The constants were developed using the MARE program with plant specific inputs for PBAPS. Values are listed on Table IV.A.1, in mrad/yr per  $\mu\text{Ci}/\text{sec}$ .

IV.B.1. b. (Cont'd)

$\tilde{Q}_{is}$  = The release of noble gas radionuclides,  $i$ , in gaseous effluents from the stack determined by isotopic analysis, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

IV.B.2. for beta radiation:

a. Gross Release Method

$$D_\beta = 3.17 \times 10^{-8} N [(\overline{\chi/Q})_v \tilde{Q}_v + (\overline{\chi/Q})_s \tilde{Q}_s]$$

where:

The location is the SITE BOUNDARY 1100m SSE from the vents. This location results in the highest calculated gamma air dose from noble gas releases.

$D_\beta$  = beta air dose, in mrad.

$3.17 \times 10^{-8}$  = years per second.

$N$  =  $1.03 \times 10^4$  mrad/yr per  $\mu\text{Ci}/\text{m}^3$ ; the air dose factor due to beta emissions for Kr-87. (Reg. Guide 1.109, Table B-1)

$(\overline{\chi/Q})_v$  =  $1.12 \times 10^{-6}$  sec/ $\text{m}^3$ ; the highest calculated annual average relative concentration from vent releases for any area at or beyond the SITE BOUNDARY.

~

$Q_v$  = The gross release of noble gas radionuclides in gaseous effluents from all vents determined by gross activity vent monitors, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

$(\overline{\chi/Q})_s$  =  $9.97 \times 10^{-8} \text{ sec/m}^3$ ; the highest calculated annual average relative concentration from the stack releases for any area at or beyond the SITE BOUNDARY.

$\sim$   
 $Q_s$  = The gross release of noble gas radionuclides in gaseous releases from the stack determined by gross activity stack monitors, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

#### IV.B.2. b. Isotopic Analysis Method

$$D_\beta = 3.17 \times 10^{-8} \sum_i N_i [(\overline{\chi/Q})_v \tilde{Q}_{iv} + (\overline{\chi/Q})_s \tilde{Q}_{is}]$$

$3.17 \times 10^{-8}$  = years per second.

$N_i$  = The air dose factor due to beta emissions for each identified noble gas radionuclide. Values are listed on Table IV.A.1, in mrad/yr per  $\mu\text{Ci/m}^3$ .

$(\overline{\chi/Q})_v$  =  $1.12 \times 10^{-6} \text{ sec/m}^3$ ; the highest calculated annual average relative concentration from vent releases for any area at or beyond the SITE BOUNDARY.

$\sim$   
 $Q_{iv}$  = The release of noble gas radionuclide, i, in gaseous effluents from all vents as determined by isotopic analysis, in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

$(\overline{\chi/Q})_s$  =  $9.97 \times 10^{-8} \text{ sec/m}^3$ ; the highest calculated annual average relative concentration from the stack releases for any area at or beyond the SITE BOUNDARY.

$\sim$   
 $Q_{is}$  = The release of noble gas radionuclide, i, in gaseous effluents from the stack as determined by isotopic analysis, in  $\mu\text{Ci}$ . Releases shall be cumulative over the

calendar quarter or year, as appropriate.

IV.C ODCMS 4.8.C.3.1

The dose to an individual from iodine-131, iodine-133, tritium and radioactive materials in particulate form and radionuclides other than noble gases with half-lives greater than eight days in gaseous effluents released to areas at and beyond the SITE BOUNDARY.

The dose shall be determined for the limiting organ. Infant thyroid doses are dominating any time that either iodine-131 release rates are more than two (2) percent of total release rates or iodine-133 exceeds 25 percent of total release rates. In these cases only iodine-131 and iodine-133 are potentially significant.

For cases where there is no detectable iodine releases, doses shall be determined for infant bone and liver. Both bone and liver doses are calculated because the controlling dose is dependent upon the presence of strontium.

When it is not clear whether thyroid, bone, or liver doses are controlling, all three shall be calculated and the limiting dose identified.

$$D = 3.17 \times 10^{-8} \sum_i F_e R_i \left[ W_s \tilde{Q}_{is} + W_v \tilde{Q}_{iv} + W_v \tilde{q}_{iv} \right]$$

where:

Location is the critical pathway dairy 1500m SW from vents.

- $D$  = limiting dose to the critical infant organ, from the milk, or inhalation, or ground plane pathways, in mrem.
- $3.17 \times 10^{-8}$  = years per second.
- $F_e$  = Fraction that is elemental (0.5 for iodines and 1.0 for all other elements).
- $R_i$  = The dose factor for each identified radionuclide;  $i$ , in  $m^2$  (mrem/yr) per  $\mu\text{Ci/sec}$  except tritium, carbon-14, and inhalation pathway, which is in mrem/yr per  $\mu\text{Ci}/m^3$ . The dose factors are for the critical individual organ for the most restrictive age group, infant. Table IV.C.1 list values for the ingestion pathway, Table IV.C.2 for the inhalation pathway, and Table IV.C.3 for the ground plane pathway. See Site Specific Data.\*\*

## IV.C (Continued)

$W_s$  =  $4.19 \times 10^{-10}$  meters<sup>-2</sup>  $(\overline{D/Q})$  for the ingestion and ground plane pathway for stack releases. Tritium, carbon-14, and the inhalation pathway use a  $(\chi/Q)$  of  $8.11 \times 10^{-9}$  sec/m<sup>3</sup>.

$\tilde{Q}_{is}$  = The release of radionuclide, i, in gaseous effluents from the stack determined by the effluent sampling and analysis program (ODCMS Table 4.8.C.1), in  $\mu\text{Ci}$ . Releases shall be cumulative over the calendar quarter or year, as appropriate.

$W_v$  =  $1.58 \times 10^{-9}$  meters<sup>-2</sup>  $(\overline{D/Q})$  for the ingestion and ground plane pathway for vent releases. Tritium, carbon-14, and the inhalation pathway use a  $(\chi/Q)$  of  $4.43 \times 10^{-7}$  sec/m<sup>3</sup>.

\*\* See Note 2 and 3 in Bases

$\tilde{Q}_{iv}$  = The release of radionuclide, i, in gaseous effluents from the vents determined by the effluent sampling and analysis program (ODCMS Table 4.8.C.1) in  $\mu\text{Ci}$ . Release shall be cumulative over the calendar quarter or year, as appropriate.

$\tilde{q}_{iv}$  = The release of radionuclide, i, in gaseous effluents from abnormal release sources in  $\mu\text{Ci}$ . Release shall be cumulative over the calendar quarter or year, as appropriate.

TABLE IV.C.1

## Ri CONSTANTS INGESTION PATHWAY

 $(\text{m}^2 \text{ (mrem/yr) per } \mu\text{Ci/sec})^*$ 

Radionuclide	Infant Bone	Infant Liver	Infant Thyroid	Infant Kidney	Infant Lung	Infant GI-LLI	Infant Skin	Infant T Body
H-3	no data	1.30E+03	1.30E+03	1.30E+03	1.30E+03	1.30E+03	no data	1.30E+03
C-14	3.23E+06	6.89E+05	6.89E+05	6.89E+05	6.89E+05	6.89E+05	no data	6.89E+05
NA-24	4.48E+06	4.48E+06	4.48E+06	4.48E+06	4.48E+06	4.48E+06	no data	4.48E+06
P-32	4.74E+10	2.79E+09	no data	no data	no data	6.41E+08	no data	1.84E+09
CR-51	no data	no data	3.35E+04	7.32E+03	6.51E+04	1.50E+06	no data	5.13E+04
MN-54	no data	1.93E+07	no data	4.28E+06	no data	7.09E+06	no data	4.38E+06
FE-55	7.09E+07	4.58E+07	no data	no data	2.24E+07	5.81E+06	no data	1.22E+07
MN-56	no data	9.24E-03	no data	7.94E-03	no data	8.39E-01	no data	1.59E-03
CO-58	no data	9.57E+06	no data	no data	no data	2.39E+07	no data	2.39E+07
FE-59	7.92E+07	1.38E+08	no data	no data	4.09E+07	6.61E+07	no data	5.45E+07
CO-60	no data	4.69E+07	no data	no data	no data	1.12E+08	no data	1.11E+08
NI-63	1.88E+10	1.17E+09	no data	no data	no data	5.80E+07	no data	6.54E+08
CU-64	no data	5.42E+04	no data	9.17E+04	no data	1.11E+06	no data	2.51E+04
NI-65	1.03E+00	1.16E-01	no data	no data	no data	8.85E+00	no data	5.29E-02
ZN-65	2.69E+09	9.22E+09	no data	4.47E+09	no data	7.78E+09	no data	4.25E+09
ZN-69	3.09E+04	5.56E+04	no data	2.31E+04	no data	4.54E+06	no data	4.14E+03
BR-83	no data	no data	no data	no data	no data	no data	no data	1.20E-01
BR-84	no data	no data	no data	no data	no data	no data	no data	1.64E-23
BR-85	no data	no data	no data	no data	no data	no data	no data	no data
RB-86	no data	6.69E+09	no data	no data	no data	1.71E+08	no data	3.31E+09
RB-88	no data	5.60E-45	no data	no data	no data	5.45E-45	no data	3.07E-45
RB-89	no data	9.86E-53	no data	no data	no data	3.36E-53	no data	6.79E-53
SR-89	4.58E+09	no data	no data	no data	no data	9.42E+07	no data	1.31E+08
SR-90	6.55E+10	no data	no data	no data	no data	8.18E+08	no data	1.67E+10
Y-90	1.99E+02	no data	no data	no data	no data	2.74E+05	no data	5.33E+00
SR-91	7.94E+04	no data	no data	no data	no data	9.40E+04	no data	2.87E+03
Y-91M	1.66E-19	no data	no data	no data	no data	5.53E-16	no data	5.65E-21
Y-91	2.77E+04	no data	no data	no data	no data	1.98E+06	no data	7.37E+02
SR-92	1.36E+00	no data	no data	no data	no data	1.47E+01	no data	5.05E-02
Y-92	1.57E-04	no data	no data	no data	no data	3.01E+00	no data	4.43E-06
Y-93	6.31E-01	no data	no data	no data	no data	4.98E+03	no data	1.72E-02
NB-95	1.98E+05	8.16E+04	no data	5.85E+04	no data	6.89E+07	no data	4.72E+04
ZR-95	2.62E+03	6.40E+02	no data	6.89E+02	no data	3.19E+05	no data	4.54E+02
ZR-97	1.19E+00	2.04E-01	no data	2.05E-01	no data	1.30E+04	no data	9.31E-02
MO-99	no data	6.07E+07	no data	9.07E+07	no data	2.00E+07	no data	1.18E+07
TC-99M	8.04E+00	1.66E+01	no data	1.78E+02	8.67E+00	4.82E+03	no data	2.14E+02
TC-101	7.44E-60	9.38E-60	no data	1.11E-58	5.11E-60	1.59E-57	no data	9.28E-59
RU-103	2.97E+03	no data	no data	6.18E+03	no data	3.61E+04	no data	9.93E+02
RU-105	2.36E-03	no data	no data	1.73E-02	no data	9.38E-01	no data	7.94E-04
RU-106	9.54E+04	no data	no data	1.13E+05	no data	7.24E+05	no data	1.19E+04
AG-110M	1.87E+08	1.37E+08	no data	1.95E+08	no data	7.09E+09	no data	9.04E+07
SB-124	5.31E+07	7.81E+05	1.41E+05	no data	3.32E+07	1.64E+08	no data	1.64E+07
SB-125	5.23E+07	5.06E+05	6.55E+04	no data	3.03E+07	6.98E+07	no data	1.08E+07
TE-125M	5.68E+07	1.90E+07	1.91E+07	no data	no data	2.71E+07	no data	7.68E+06
TE-127M	1.82E+08	6.03E+07	5.26E+07	4.48E+08	no data	7.34E+07	no data	2.20E+07
TE-127	1.85E+03	6.19E+02	1.50E+03	4.51E+03	no data	3.88E+04	no data	3.97E+02



TE-129M	1.84E+08	6.32E+07	7.08E+07	4.61E+08	no data	1.10E+08	no data	2.84E+07
TE-129	7.99E-10	2.76E-10	6.70E-10	1.99E-09	no data	6.39E-08	no data	1.87E-10
I-130	1.04E+06	2.28E+06	2.56E+08	2.51E+06	no data	4.89E+05	no data	9.17E+05
I-131	7.97E+08	9.39E+08	3.08E+11	1.10E+09	no data	3.35E+07	no data	4.13E+08
TE-131M	9.87E+05	3.97E+05	8.05E+05	2.73E+06	no data	6.69E+06	no data	3.28E+05
TE-131	1.03E-32	3.79E-33	9.15E-33	2.62E-32	no data	4.14E-31	no data	2.88E-33
I-132	3.66E-01	7.43E-01	3.48E+01	8.29E-01	no data	6.02E-01	no data	2.65E-01
TE-132	6.17E+06	3.05E+06	4.51E+06	1.91E+07	no data	1.13E+07	no data	2.85E+06
I-133	1.06E+07	1.54E+07	2.81E+09	1.81E+07	no data	2.61E+06	no data	4.52E+06
CS-134	1.90E+10	3.54E+10	no data	9.11E+09	3.73E+09	9.61E+07	no data	3.57E+09
I-134	4.81E-12	9.86E-12	2.30E-10	1.10E-11	no data	1.02E-11	no data	3.51E-12
I-135	3.21E+04	6.39E+04	5.73E+06	7.12E+04	no data	2.31E+04	no data	2.33E+04
CS-136	5.80E+08	1.71E+09	no data	6.80E+08	1.39E+08	2.59E+07	no data	6.37E+08
CS-137	2.77E+10	3.24E+10	no data	8.71E+09	3.53E+09	1.01E+08	no data	2.30E+09
CS-138	2.58E-23	4.20E-23	no data	2.09E-23	3.27E-24	6.71E-23	no data	2.04E-23
BA-139	1.26E-07	8.32E-11	no data	5.00E-11	5.04E-11	7.95E-06	no data	3.63E-09
BA-140	7.09E+07	7.09E+04	no data	1.68E+04	4.35E+04	1.74E+07	no data	3.65E+06
LA-140	1.18E+01	4.67E+00	no data	no data	no data	5.49E+04	no data	1.20E+00
BA-141	1.41E-45	9.65E-49	no data	5.80E-49	5.87E-49	1.72E-44	no data	4.44E-47
CE-141	1.42E+04	8.69E+03	no data	2.68E+03	no data	4.49E+06	no data	1.02E+03
BA-142	7.43E-80	6.18E-83	no data	3.56E-83	3.74E-83	3.07E-79	no data	3.66E-81
LA-142	4.99E-11	1.83E-11	no data	no data	no data	3.11E-06	no data	4.39E-12
CE-143	1.16E+02	7.70E+04	no data	2.24E+01	no data	4.49E+05	no data	8.78E+00
PR-143	4.38E+02	1.64E+02	no data	6.09E+01	no data	2.31E+05	no data	2.17E+01
CE-144	1.14E+06	4.68E+05	no data	1.89E+05	no data	6.55E+07	no data	6.40E+04
PR-144	1.70E-53	6.59E-54	no data	2.39E-54	no data	3.07E-49	no data	8.58E-55
ND-147	2.58E+02	2.65E+02	no data	1.02E+02	no data	1.68E+05	no data	1.63E+01
W-187	1.79E+04	1.24E+04	no data	no data	no data	7.31E+05	no data	4.30E+03
NP-239	1.06E+01	9.51E-01	no data	1.90E+00	no data	2.75E+04	no data	5.37E-01
NP-237	5.33E+07	3.53E+06	no data	1.41E+07	no data	1.83E+06	no data	2.33E+06
NP-238	1.02E+02	2.56E+00	no data	5.58E+00	no data	3.42E+04	no data	1.57E+00

\* Tritium and C-14  $R_i$  values in units of mrem/yr per  $\mu\text{Ci}/\text{m}^3$

TABLE IV.C.2  
 Ri CONSTANTS INHALATION PATHWAY  
 (mrem/yr per  $\mu\text{Ci}/\text{m}^3$ )

Radionuclide	Infant Bone	Infant Liver	Infant Thyroid	Infant Kidney	Infant Lung	Infant GI-LLI	Infant Skin	Infant T Body
H-3	no data	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02	no data	6.47E+02
C-14	2.65E+04	5.31E+03	5.31E+03	5.31E+03	5.31E+03	5.31E+03	no data	5.31E+03
NA-24	1.06E+04	1.06E+04	1.06E+04	1.06E+04	1.06E+04	1.06E+04	no data	1.06E+04
P-32	2.03E+06	1.12E+05	no data	no data	no data	1.61E+04	no data	7.74E+04
CR-51	no data	no data	5.75E+01	1.32E+01	1.28E+04	3.57E+02	no data	8.95E+01
MN-54	no data	2.53E+04	no data	4.98E+03	1.00E+06	7.06E+03	no data	4.98E+03
FE-55	1.97E+04	1.18E+04	no data	no data	8.69E+04	1.10E+03	no data	3.33E+03
MN-56	no data	1.54E+00	no data	1.10E+00	1.25E+04	7.17E+04	no data	2.21E-01
CO-58	no data	1.22E+03	no data	no data	7.77E+05	1.11E+04	no data	1.82E+03
FE-59	1.36E+04	2.35E+04	no data	no data	1.02E+06	2.48E+04	no data	9.48E+03
CO-60	no data	8.02E+03	no data	no data	4.51E+06	3.19E+04	no data	1.18E+04
NI-63	3.39E+05	2.04E+04	no data	no data	2.09E+05	2.42E+03	no data	1.16E+04
CU-64	no data	1.88E+00	no data	3.98E+00	9.30E+03	1.50E+04	no data	7.74E-01
NI-65	2.39E+00	2.84E-01	no data	no data	8.12E+03	5.01E+04	no data	1.23E-01
ZN-65	1.93E+04	6.26E+04	no data	3.25E+04	6.47E+05	5.14E+04	no data	3.11E+04
ZN-69	5.39E-02	9.67E-02	no data	4.02E+02	1.47E+03	1.32E+04	no data	7.18E-03
BR-83	no data	no data	no data	no data	no data	no data	no data	3.81E+02
BR-84	no data	no data	no data	no data	no data	no data	no data	4.00E+02
BR-85	no data	no data	no data	no data	no data	no data	no data	2.04E+01
RB-86	no data	1.90E+05	no data	no data	no data	3.04E+03	no data	8.82E+04
RB-88	no data	5.57E+02	no data	no data	no data	3.39E+02	no data	2.87E+02
RB-89	no data	3.21E+02	no data	no data	no data	6.82E+01	no data	2.06E+02
SR-89	3.98E+05	no data	no data	no data	2.03E+06	6.40E+04	no data	1.14E+04
SR-90	4.09E+07	no data	no data	no data	1.12E+07	1.31E+05	no data	2.59E+06
Y-90	3.29E+03	no data	no data	no data	2.69E+05	1.04E+05	no data	8.82E+01
SR-91	9.56E+01	no data	no data	no data	5.26E+04	7.34E+04	no data	3.46E+00
Y-91M	4.07E-01	no data	no data	no data	2.79E+03	2.35E+03	no data	1.39E-02
Y-91	5.88E+05	no data	no data	no data	2.45E+06	7.03E+04	no data	1.57E+04
SR-92	1.05E+01	no data	no data	no data	2.38E+04	1.40E+05	no data	3.91E-01
Y-92	1.64E+01	no data	no data	no data	2.45E+04	1.27E+05	no data	4.61E-01
Y-93	1.50E+02	no data	no data	no data	7.64E+04	1.67E+05	no data	4.07E+00
NB-95	1.57E+04	6.43E+03	no data	4.72E+03	4.79E+05	1.27E+04	no data	3.78E+03
ZR-95	1.15E+05	2.79E+04	no data	3.11E+04	1.75E+06	2.17E+04	no data	2.03E+04
ZR-97	1.50E+02	2.56E+01	no data	2.59E+01	1.10E+05	1.40E+05	no data	1.17E+01
MO-99	no data	1.65E+02	no data	2.65E+02	1.35E+05	4.87E+04	no data	3.23E+01
TC-99M	1.40E-03	2.88E-03	no data	3.11E-02	8.11E+02	2.03E+03	no data	3.72E-02
TC-101	6.51E-05	8.23E-05	no data	9.79E-04	5.84E+02	8.44E+02	no data	8.12E-04
RU-103	2.02E+03	no data	no data	4.24E+03	5.52E+05	1.61E+04	no data	6.79E+02
RU-105	1.22E+00	no data	no data	8.99E-01	1.57E+04	4.84E+04	no data	4.10E-01
RU-106	8.68E+04	no data	no data	1.07E+05	1.16E+07	1.64E+05	no data	1.09E+04
AG-110M	9.98E+03	7.22E+03	no data	1.09E+04	3.67E+06	3.30E+04	no data	5.00E+03
TE-125M	4.76E+03	1.99E+03	1.62E+03	no data	4.47E+05	1.29E+04	no data	6.58E+02
TE-127M	1.67E+04	6.90E+03	4.87E+03	3.75E+04	1.31E+06	2.73E+04	no data	2.07E+03
TE-127	2.23E+00	9.53E-01	1.85E+00	4.86E+00	1.04E+04	2.44E+04	no data	4.89E-01
TE-129M	1.41E+04	6.09E+03	5.47E+03	3.18E+04	1.68E+06	6.90E+04	no data	2.23E+03
TE-129	7.88E-02	3.47E-02	6.75E-02	1.75E-01	3.00E+03	2.63E+04	no data	1.88E-02
I-130	6.36E+03	1.39E+04	1.60E+06	1.53E+04	no data	1.99E+03	no data	5.57E+03
I-131	3.79E+04	4.44E+04	1.48E+07	5.18E+04	no data	1.06E+03	no data	1.96E+04

TE-131M	1.07E+02	5.50E+01	8.93E+01	2.65E+02	1.99E+05	1.19E+05	no data	3.63E+01
TE-131	1.74E-02	8.22E-03	1.58E-02	3.99E-02	2.06E+03	8.22E+03	no data	5.00E-03
I-132	1.69E+03	3.54E+03	1.69E+05	3.95E+03	no data	1.90E+03	no data	1.26E+03
TE-132	3.72E+02	2.37E+02	2.79E+02	1.04E+03	3.40E+05	4.41E+04	no data	1.76E+02
I-133	1.32E+04	1.92E+04	3.56E+06	2.24E+04	no data	2.16E+03	no data	5.60E+03
CS-134	3.96E+05	7.03E+05	no data	1.90E+05	7.97E+04	1.33E+03	no data	7.45E+04
I-134	9.21E+02	1.88E+03	4.45E+04	2.09E+03	no data	1.29E+03	no data	6.65E+02
I-135	3.86E+03	7.60E+03	6.96E+05	8.47E+03	no data	1.83E+03	no data	2.77E+03
CS-136	4.83E+04	1.35E+05	no data	5.64E+04	1.18E+04	1.43E+03	no data	5.29E+04
CS-137	5.49E+05	6.12E+05	no data	1.72E+05	7.13E+04	1.33E+03	no data	4.55E+04
CS-138	5.05E+02	7.81E+02	no data	4.10E+02	6.54E+01	8.76E+02	no data	3.98E+02
BA-139	1.48E+00	9.84E-04	no data	5.92E-04	5.95E+03	5.10E+04	no data	4.30E-02
BA-140	5.60E+04	5.60E+01	no data	1.34E+01	1.60E+06	3.84E+04	no data	2.90E+03
LA-140	5.05E+02	2.00E+02	no data	no data	1.68E+05	8.48E+04	no data	5.15E+01
BA-141	1.57E-01	1.08E-04	no data	6.50E-05	2.97E+03	4.75E+03	no data	4.97E-03
CE-141	2.77E+04	1.67E+04	no data	5.25E+03	5.17E+05	2.16E+04	no data	1.99E+03
BA-142	3.98E-02	3.30E-05	no data	1.90E-05	1.55E+03	6.93E+02	no data	1.96E-03
LA-142	1.03E+00	3.77E-01	no data	no data	8.22E+03	5.95E+04	no data	9.04E-02
CE-143	2.93E+02	1.93E+02	no data	5.64E+01	1.16E+05	4.97E+04	no data	2.21E+01
PR-143	1.40E+04	5.24E+03	no data	1.97E+03	4.33E+05	3.72E+04	no data	6.99E+02
CE-144	3.19E+06	1.21E+06	no data	5.38E+05	9.84E+06	1.48E+05	no data	1.76E+05
PR-144	4.79E-02	1.85E-02	no data	6.72E-03	1.61E+03	4.28E+03	no data	2.41E-03
ND-147	7.94E+03	8.13E+03	no data	3.15E+03	3.22E+05	3.12E+04	no data	5.00E+02
W-187	1.30E+01	9.02E+00	no data	no data	3.96E+04	3.56E+04	no data	3.11E+00
NP-239	3.71E+02	3.32E+01	no data	6.62E+01	5.95E+04	2.49E+04	no data	1.88E+01
U-232	3.60E+08	no data	no data	3.36E+07	2.09E+09	6.10E+04	no data	2.98E+007
U-233	7.62E+07	no data	no data	1.53E+07	4.98E+08	5.64E+04	no data	5.36E+06
U-234	7.31E+07	no data	no data	1.50E+07	4.89E+08	5.53E+04	no data	5.25E+06
U-235	7.01E+07	no data	no data	1.41E+07	4.59E+08	7.03E+04	no data	4.93E+06
U-236	7.01E+07	no data	no data	1.44E+07	4.69E+08	5.19E+04	no data	5.04E+06
U-237	4.55E+02	no data	no data	1.13E+03	1.28E+05	1.83E+04	no data	1.21E+02
U-238	6.71E+07	no data	no data	1.32E+07	4.28E+08	4.96E+04	no data	4.61E+06
NP-237	4.03E+09	2.39E+09	no data	1.08E+09	4.89E+08	7.14E+04	no data	1.76E+08
NP-238	3.74E+03	8.47E+02	no data	2.06E+02	1.29E+05	3.61E+04	no data	5.82E+01
PU-238	3.77E+09	2.35E+09	no data	6.50E+08	1.26E+09	6.57E+04	no data	1.78E+08
PU-239	4.10E+09	2.46E+09	no data	6.93E+08	1.19E+09	5.99E+04	no data	1.88E+08
PU-240	4.10E+09	2.45E+09	no data	6.92E+08	1.19E+09	6.10E+04	no data	1.88E+08
PU-241	1.18E+08	2.59E+07	no data	1.61E+07	1.07E+06	1.26E+03	no data	4.35E+06
PU-242	3.81E+09	2.37E+09	no data	6.68E+08	1.14E+09	5.88E+04	no data	1.81E+08
PU-244	4.44E+09	2.72E+09	no data	7.64E+08	1.31E+09	8.76E+04	no data	2.07E+08
AM-241	4.41E+09	2.73E+09	no data	1.11E+09	5.68E+08	6.69E+04	no data	1.83E+08
AM-242M	4.55E+09	2.60E+09	no data	1.12E+09	2.30E+08	8.41E+04	no data	1.89E+08
AM-243	4.34E+09	2.63E+09	no data	1.08E+09	5.39E+08	7.84E+04	no data	1.78E+08
CM-242	1.79E+08	1.21E+08	no data	2.37E+07	4.16E+08	7.14E+04	no data	7.98E+06
CM-243	3.46E+09	2.13E+09	no data	5.47E+08	5.94E+08	7.03E+04	no data	1.48E+08
CM-244	2.90E+09	1.78E+09	no data	4.49E+08	5.71E+08	6.80E+04	no data	1.24E+08
CM-245	4.51E+09	2.74E+09	no data	7.32E+08	5.49E+08	6.34E+04	no data	1.90E+08
CM-246	4.48E+09	2.74E+09	no data	7.32E+08	5.59E+08	6.23E+04	no data	1.90E+08
CM-247	4.35E+09	2.70E+09	no data	7.21E+08	5.49E+08	8.19E+04	no data	1.86E+08
CM-248	3.61E+10	2.23E+10	no data	5.94E+09	4.52E+09	1.32E+06	no data	1.54E+09
CF-252	3.32E+09	no data	no data	no data	1.92E+09	2.59E+05	no data	1.41E+08

TABLE IV.C.3  
 Ri CONSTANTS GROUND PLANE PATHWAY  
 (m<sup>2</sup> (mrem/yr) per  $\mu$ Ci/sec)

AG-110M	3.44E+09
AM-241	6.85E+08
AM-242M	9.61E+07
AM-243	5.03E+09
BA-139	1.06E+05
BA-140	2.05E+07
BA-141	4.18E+04
BA-142	4.49E+04
BR-83	4.87E+03
BR-84	2.03E+05
BR-85	no data
C-14	no data
CE-141	1.37E+07
CE-143	2.31E+06
CE-144	6.96E+07
CF-252	4.83E+10
CM-242	6.85E+05
CM-243	7.05E+09
CM-244	7.84E+06
CM-245	3.67E+09
CM-246	3.86E+06
CM-247	8.51E+09
CM-248	2.63E+10
CO-58	3.79E+08
CO-60	2.32E+10
CR-51	4.66E+06
CS-134	6.91E+09
CS-136	1.50E+08
CS-137	1.30E+10
CS-138	3.59E+05
CU-64	6.07E+05
FE-55	no data
FE-59	2.72E+08
H-3	no data
I-130	5.51E+06
I-131	1.73E+07
I-132	1.23E+06
I-133	2.45E+06
I-134	4.46E+05
I-135	2.52E+06
LA-140	1.92E+07
LA-142	7.60E+05
MN-54	1.38E+09
MN-56	9.04E+05
MO-99	3.99E+06

NA-24	1.19E+07
NB-95	1.37E+08
ND-147	8.40E+06
NI-63	no data
NI-65	2.97E+05
NP-237	5.42E+09
NP-238	4.53E+06
NP-239	1.71E+06
P-32	no data
PR-143	no data
PR-144	1.83E+03
PU-238	4.65E+06
PU-239	3.06E+06
PU-240	5.02E+06
PU-241	1.14E+07
PU-242	4.26E+06
PU-244	3.46E+09
RB-86	8.97E+06
RB-88	3.31E+04
RB-89	1.23E+05
RU-103	1.08E+08
RU-105	6.36E+05
RU-106	4.22E+08
SB-124	5.98E+08
SB-125	2.38E+09
SR-89	2.16E+04
SR-90	no data
SR-91	2.15E+06
SR-92	7.77E+05
TC-101	2.04E+04
TC-99M	1.84E+05
TE-125M	1.55E+06
TE-127	2.98E+03
TE-127M	9.17E+04
TE-129	2.62E+04
TE-129M	1.98E+07
TE-131	2.92E+04
TE-131M	8.03E+06
TE-132	4.23E+06
U-232	9.12E+06
U-233	8.90E+09
U-234	2.45E+06
U-235	1.24E+10
U-236	8.13E+04
U-237	5.16E+07
U-238	4.26E+08
W-187	2.36E+06
Y-90	4.49E+03
Y-91	1.07E+06
Y-91M	1.00E+05

Y-92	1.80E+05
Y-93	1.83E+05
ZN-65	7.46E+08
ZN-69	no data
ZR-95	2.45E+08
ZR-97	2.96E+06

IV.D ODCMS 4.8.C.5.1

The projected doses from releases of gaseous effluents to areas at and beyond the SITE BOUNDARY shall be calculated in accordance with the following sections of this manual:

- a. gamma air dose - IV.B.1
- b. beta air dose - IV.B.2
- c. organ dose - IV.C

The projected dose calculation shall be based on expected release from plant operation. The normal release pathways result in the maximum releases from the plant. Any alternative release pathways result in lower releases and, therefore, lower doses.

IV.E Technical Requirements Manual Test Requirement (TR) 3.5.3

IV.E.1 The recombiner hydrogen analyzers currently used at Peach Bottom are Whittaker Electrochemical type. (Analyzers 4083A and 4083B on Unit 2. Analyzers 5083A and 5083B on Unit 3.)

IV.E.2 The calibration gas is in accordance with approved procedures.

IV.F ODCMS 4.8.C.7.1 and 4.8.C.7.2

IV.F.1 Section Removed.

IV.F.2 Section Removed.

V.A. ODCMS 4.8.D.1.1 and 4.8.D.1.2V.A.1 ODCMS 4.8.D.1.1

The total gaseous and liquid cumulative dose contributions are limited by ODCMS 3.8.D.1 to 3.0 mrem for whole body and critical organ, and 55 mrem for the thyroid to preserve assumptions set forth in the 10CFR72.212 report for the spent fuel casks that are stored on the Independent Spent Fuel Storage (ISFSI) pad. Exceeding these action levels does not necessarily result in the overall 40CFR190 or 10CFR72.104 requirements not being met. Further calculations are required to determine compliance.

Whole Body

The whole body dose contribution from liquid and gaseous effluents shall be determined by the following method:

$$D_{WB} = D_r + D_\gamma$$

where:

$D_{WB}$  = whole body dose from liquid and gaseous effluents, in mrem.

$D_r$  = cumulative dose commitment to the total body from liquid effluents, in mrem (Determined by ODCM Section III.B).

$D_\gamma$  = gamma air dose, in mrad (Determined by ODCM Section IV.B, with mrad equivalent to mrem).

Critical organ(except thyroid)

The critical organ(except thyroid) dose contribution from liquid and gaseous effluents shall be determined by the following method:

$$D_{CO} = D_r + D_\gamma + D$$

where:

$D_{CO}$  = critical organ(except thyroid) dose from liquid and gaseous effluents, in mrem.

$D_r$  = cumulative dose commitment to any organ from liquid effluents, in mrem (Determined by ODCM Section III.B).

$D_\gamma$  = gamma air dose, in mrad (Determined by ODCM Section IV.B, with mrad equivalent to mrem).

$D$  = limiting dose to the critical organ(except thyroid), in mrem (Determined by ODCM Section IV.C).



Thyroid

The thyroid dose contribution from gaseous effluents shall be determined by the following method:

$$D_{Thy} = D_{\tau} + D_{\gamma} + D$$

where:

$D_{Thy}$  = thyroid dose from gaseous effluents, in mrem.

$D_{\tau}$  = cumulative dose commitment to any organ from liquid effluents, in mrem (Determined by ODCM Section III.B).

$D_{\gamma}$  = gamma air dose, in mrad (Determined by ODCM Section IV.B, with mrad equivalent to mrem).

$D$  = limiting dose to the thyroid, in mrem (Determined by ODCM Section IV.C).

V.A.2 ODCMS 4.8.D.1.2

The cumulative dose from all sources(i.e. gas and liquid effluents and direct radiation) is calculated by summing the individual doses obtained in ODCMS 4.8.D.1.1 for whole body( $D_{WB}$ ), critical organ( $D_{CO}$ ) and thyroid( $D_{Thy}$ ) with the dosimeter net dose(mrem).

Whole Body

The cumulative whole body dose from liquid, gas and direct radiation shall be determined by the following method:

$$D_{WB}^{Total} = D_{WB} + D_d$$

where:

$D_{WB}^{Total}$  = whole body dose equivalent from all sources, in mrem.

$D_{WB}$  = whole body dose from liquid and gaseous effluents, in mrem.

$D_d$  = Net dose from direct radiation, in mrem.

Critical Organ(except thyroid)

The cumulative critical organ(except thyroid) dose from liquid, gas and direct radiation shall be determined by the following method:

$$D_{CO}^{Total} = D_{CO} + D_D$$

where:

$D_{CO}^{Total}$  = critical organ(except thyroid) dose equivalent from all sources, in mrem.

$D_{CO}$  = critical organ(except thyroid) dose from liquid and gaseous effluents, in mrem.

$D_D$  = Net dose from direct radiation, in mrem.

Thyroid

The cumulative thyroid dose from gas and direct radiation shall be determined by the following method:

$$D_{Thy}^{Total} = D_{Thy} + D_D$$

where:

$D_{Thy}^{Total}$  = thyroid dose equivalent from all sources, in mrem.

$D_{Thy}$  = thyroid dose from gaseous effluents, in mrem.

$D_D$  = Net dose from direct radiation, in mrem.

The dose contribution is calculated at the discharge point for liquids and in the worst sector for gases. If necessary, the dose contribution from liquid and gas may be calculated for a real individual.

VI.A ODCMS 3.10.2.f

In accordance with ODCMS 3.10.2.f the Annual Radioactive Effluent Release Report shall include an assessment of radiation dose from radioactive liquid and gaseous effluents to MEMBERS OF THE PUBLIC due to their activities inside the SITE BOUNDARY.

There are two locations within the SITE BOUNDARY that are accessible to MEMBERS OF THE PUBLIC for activities unrelated to the operation of Peach Bottom Atomic Power Station. These locations are the Emergency Response Location 800 ft ENE from the vents and the Warehouse Checkpoint 900 ft NNE from the vents.

Annual doses will be calculated in accordance with methodology described in ODCM IV.B and IV.C, assuming inhalation pathway, plume and ground shine doses are the dominate pathway. Continuous occupancy with current year MET data shall also be used. The maximum dose calculated will be reported in the Annual Radioactive Effluent Release Report.

VII.A ODCMS 4.8.E.1.1 and 4.8.E.1.2

The radiological environment monitoring samples shall be collected pursuant to Table VII.A.1 from the locations shown on Figures VII.A.1, VII.A.2, and VII.A.3, and shall be analyzed pursuant to the requirements of Table VII.A.1.

TABLE VII.A-1

ODCM - Peach Bottom Atomic Power Station  
Radiological Environmental Monitoring Program

Pathway	Station Code	Distance and Direction from PBAPS Vents	Collection Method and Discussion	Analyses
I.	<u>Direct Radiation</u>			
Site Boundary	1L	1,100 feet NE of site	1 set of two (2)	Gamma Dose quarterly
	1A	1,500 feet SE of site	Dosimeters from each	
	2	4,700 feet SE of site	location at least	
	1I	2,900 feet SSE of site	quarterly	
	1C	4,700 feet SSE of site	Gamma dose quarterly	
	1J	4,000 feet S of site		
	1F	2,900 feet SSW of site		
	40	8,000 feet SW of site	Dosimeter sites were	
	1NN	2,700 feet WSW of site	chosen in accordance	
	1H	3,200 feet W of site	with Peach Bottom	
	1G	3,100 feet WNW of site	ODCMS Table 4.8.E.1	
	1B	2,500 feet NW of site	Item 1. Site Boundary	
	1E	3,000 feet NNW of site	stations all sectors	
	1K	4,700 feet SW of site	except several along	
	1P	2,200 feet ESE of site	Conowingo Pond.	
			Thes	
	15	19,300 feet N of site	e sectors are	
	22	12,500 feet NNE of site	monitored by stations	
	44	26,700 feet NE of site	on the east side of	
	32	14,400 feet ENE of site	Conowingo Pond. The 5	
	45	18,500 feet ENE of site	mile vicinity	
	14	10,300 feet E of site	stations cover all	
	17	21,500 feet ESE of site	sectors.	
	31A	24,100 feet SE of site		
	4K	45,900 feet SE of site	The distant and special	
	23	5,500 feet SSE of site	interest stations provide	
	27	14,400 feet S of site	information in populations.	
	48	26,500 feet SSW of site		
Intermediate Distance				

TABLE VII.A-1

ODCM - Peach Bottom Atomic Power Station  
Radiological Environmental Monitoring Program

Pathway	Station Code	Distance and Direction from PBAPS Vents	Collection Method and Discussion	Analyses
	3A	19,300 feet SW of site		
	49	21,500 feet WSW of site		
	50	26,400 feet W of site		
	51	21,000 feet WNW of site		
	26	21,800 feet NW of site		
	6B	30,400 feet NW of site		
	42	21,600 feet NNW of site		
Distant and Special Interest	43	26,200 feet NNE of site		
	5	24,400 feet E of site		
	16	67,100 feet E of site		
	24	58,200 feet ESE of site		
	2B	3,900 feet SSE of site		
	46	23,800 feet SSE of site		
	47	22,700 feet S of site		
	18	52,200 feet W of site		
	19 C	124,000 feet WNW of site		
	1T	3,100 feet WNW of site		
II. <u>Airborne</u>				
Particulates	1Z	1,500 feet SE of site	Approximately 1 cfm	Gross beta analysis
	1B	2,500 feet NW of site	continuous flow	on each weekly
	1C	4,700 feet SSE of site	through glass fiber	sample. Gamma
	3A	19,300 feet SW of site	filter which is	spectrometry shall be
	5H2 C	162,400 feet NE of site	collected weekly.	done when gross beta
			These stations	exceeds ten times the
			provide for coverage	yearly mean of
				control station value.

TABLE VII.A-1

ODCM - Peach Bottom Atomic Power Station  
Radiological Environmental Monitoring Program

Pathway	Station Code	Distance and Direction from PBAPS Vents	Collection Method and Discussion	Analyses
			of the highest annual average ground level D/Q near the site boundary, the community with the highest annual average D/Q and a control location.	Gross beta analysis done $\geq 24$ hr after sampling to allow for Radon and Thoron daughter decay.  Gamma Spec on quarterly composite by location.
Iodine	1Z 1B 1C 3A 5H2 C	1,500 feet SE of site 2,500 feet NW of site 4,700 feet SSE of site 19,300 feet SW of site 162,400 feet NE of site	A TEDA impregnated flow-through cartridge is connected to air sampler and is collected weekly at site filter change.	Iodine 131 weekly
III. <u>Waterborne</u>				
Surface	1LL C 1MM	1,200 feet ENE of site 5,500 feet SE of site	Sample collected from a continuous water sampler, monthly. In event	Gamma isotopic analysis monthly;  H-3 on quarterly

TABLE VII.A-1

ODCM - Peach Bottom Atomic Power Station  
Radiological Environmental Monitoring Program

Pathway	Station Code	Distance and Direction from PBAPS Vents	Collection Method and Discussion	Analyses
			sampler is inoperable, grab samples will be collected each calendar day until sampler returned to service.	composite
Drinking	4L 6I C 13B	45,900 feet SE of site 30,500 feet NW of site 13,300 feet ESE of site	Sample collected from a continuous water sampler monthly. In event sampler is inoperable, weekly grab samples will be collected until sampler returned to service.	Gross beta and gamma isotopic monthly,  H-3 on quarterly composite
Sediment	4J	7,400 feet SE of site	A sediment sample is taken down stream of discharge semi-annually.	Gamma isotopic analysis each sample
IV. <u>Ingestion</u>				
Milk	V C J R S X	32,600 feet W of site 5,100 feet W of site 4,900 feet SW of site 19,100 feet SE of site 9,200 feet NW of site	Sample of fresh milk is collected from each farm biweekly when cows are on pasture	I-131 analyses on each sample  Gamma isotopic analysis or Cs-134, Cs-137 by

TABLE VII.A-1

ODCM - Peach Bottom Atomic Power Station  
Radiological Environmental Monitoring Program

Pathway	Station Code	Distance and Direction from PBAPS Vents	Collection Method and Discussion	Analyses
			(April through October), monthly at other times.	chemical separation quarterly
Fish	4	6,000-10,000 feet SE of site	Two species of recreationally important fish (predator and bottom feeder) sampled in season or semiannually if not seasonal.	Gamma isotopic analyses on edible portions.
	6 C	50,000-70,000 feet NNW of site		
Food Products	1C	4,700 feet SSE of site	Samples of three (3) different kinds of broad leaf vegetation monthly when available if milk sampling is not performed	Gamma isotopic and I-131 analysis
	55 C	51,900 feet NE of site		

C = Control Location



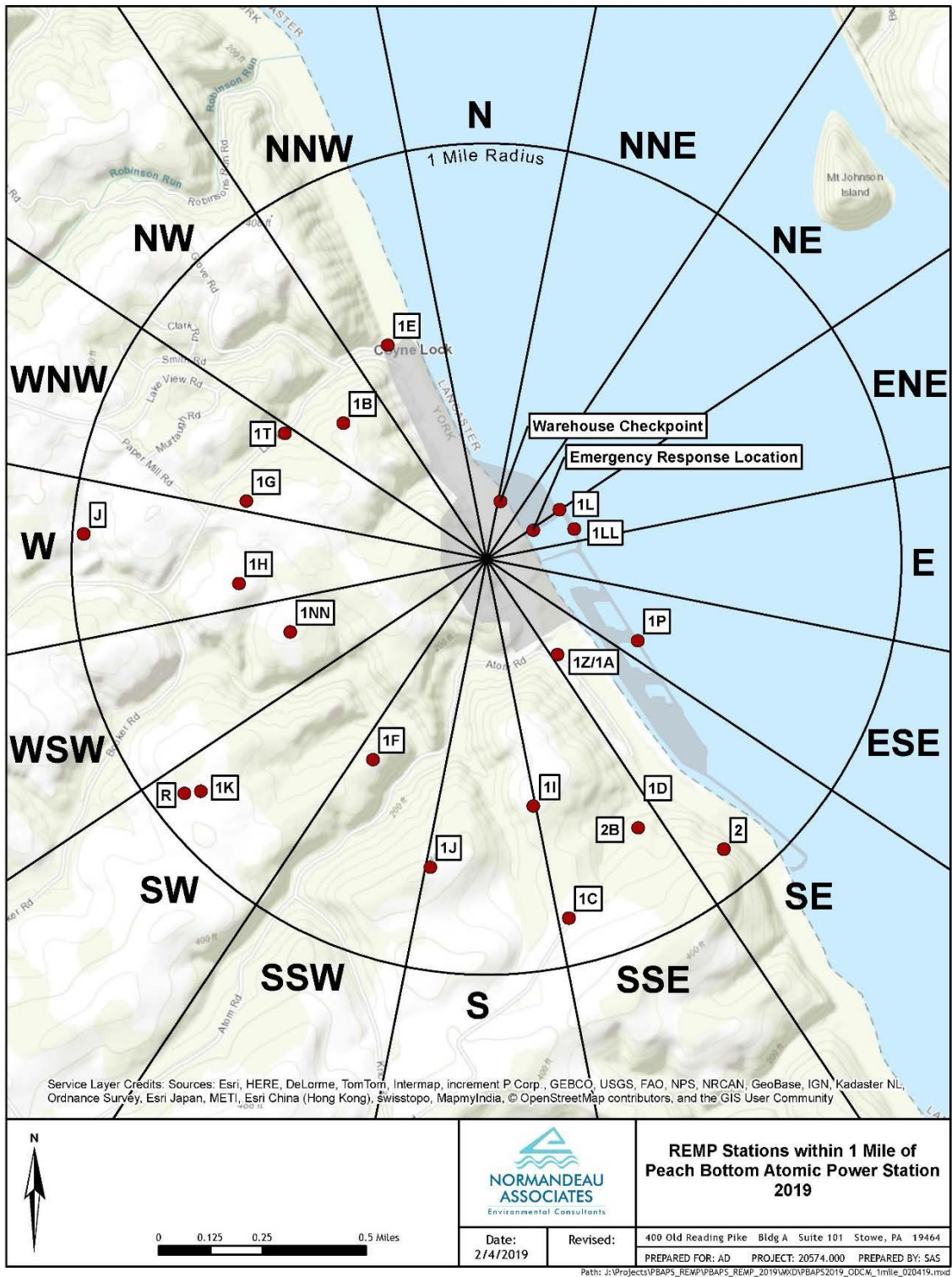


FIGURE VII.A.1  
ENVIRONMENTAL SAMPLING STATIONS AT  
SITE BOUNDARY AREA TO PEACH BOTTOM

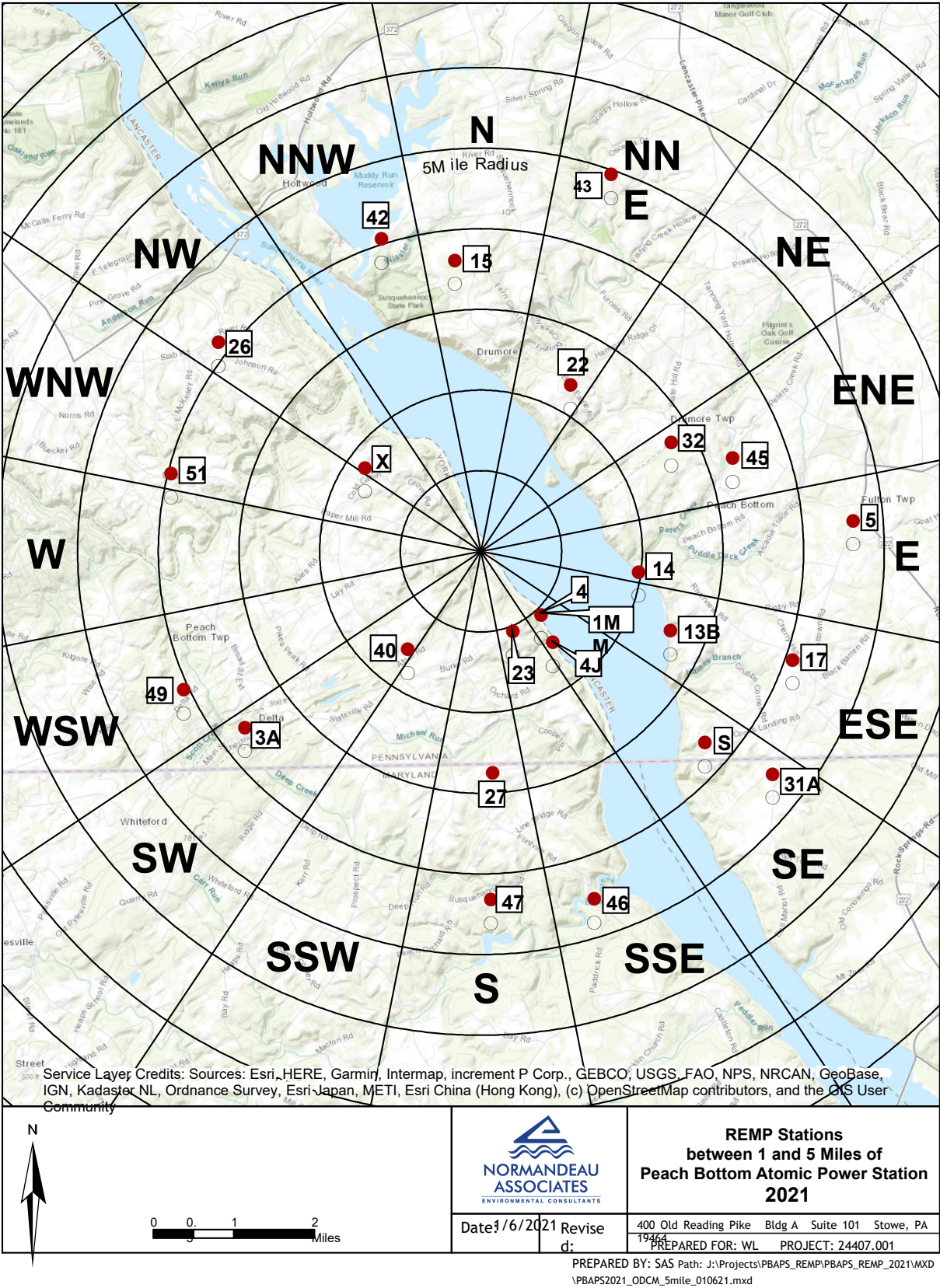


FIGURE VII.A.3  
ENVIRONMENTAL SAMPLING STATIONS  
AT Intermediate Distances PEACH BOTTOM  
Site



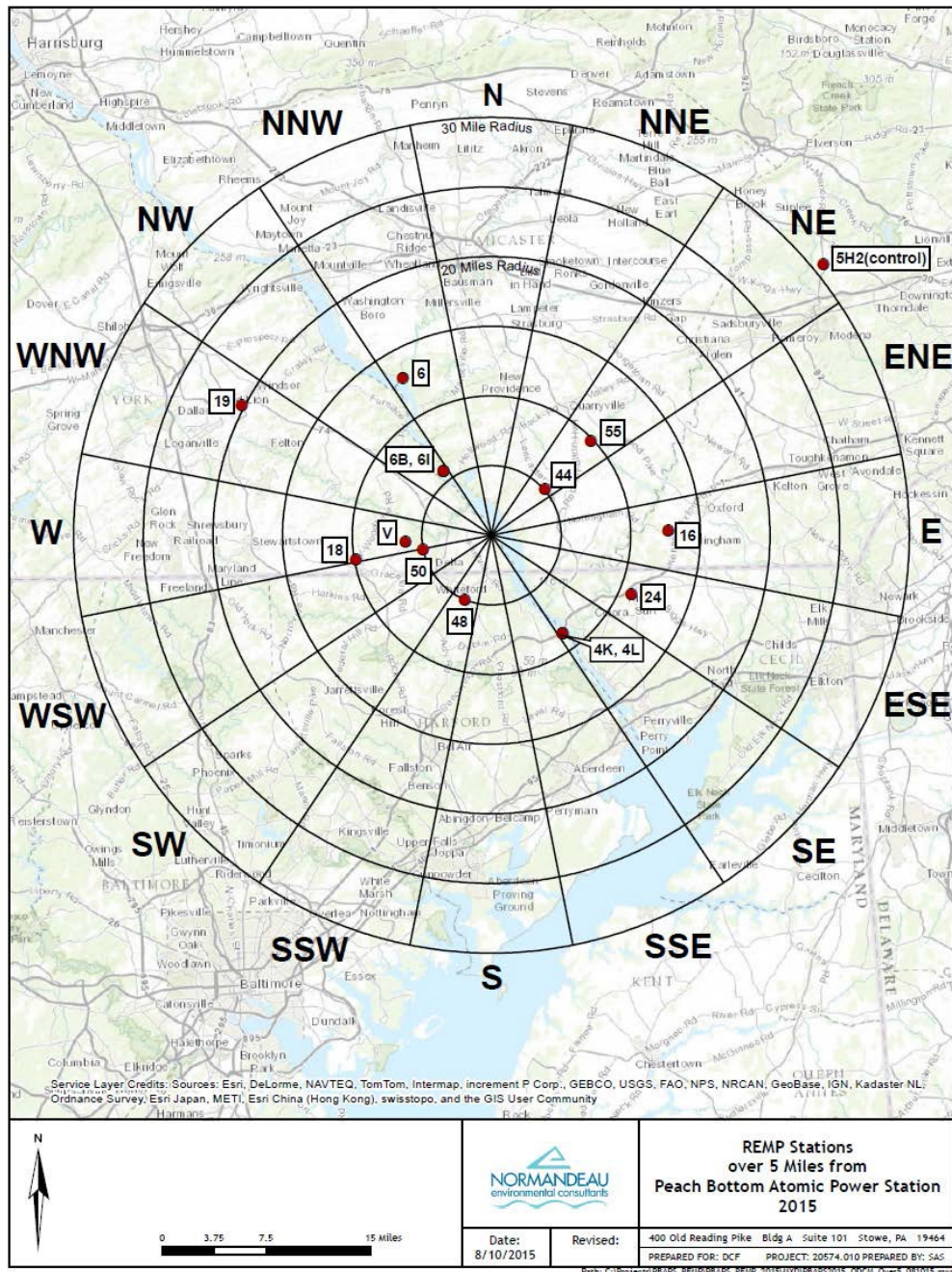


FIGURE VII.A.3  
ENVIRONMENTAL SAMPLING STATIONS AT  
REMOTE DISTANCES FROM PEACH BOTTOM SITE

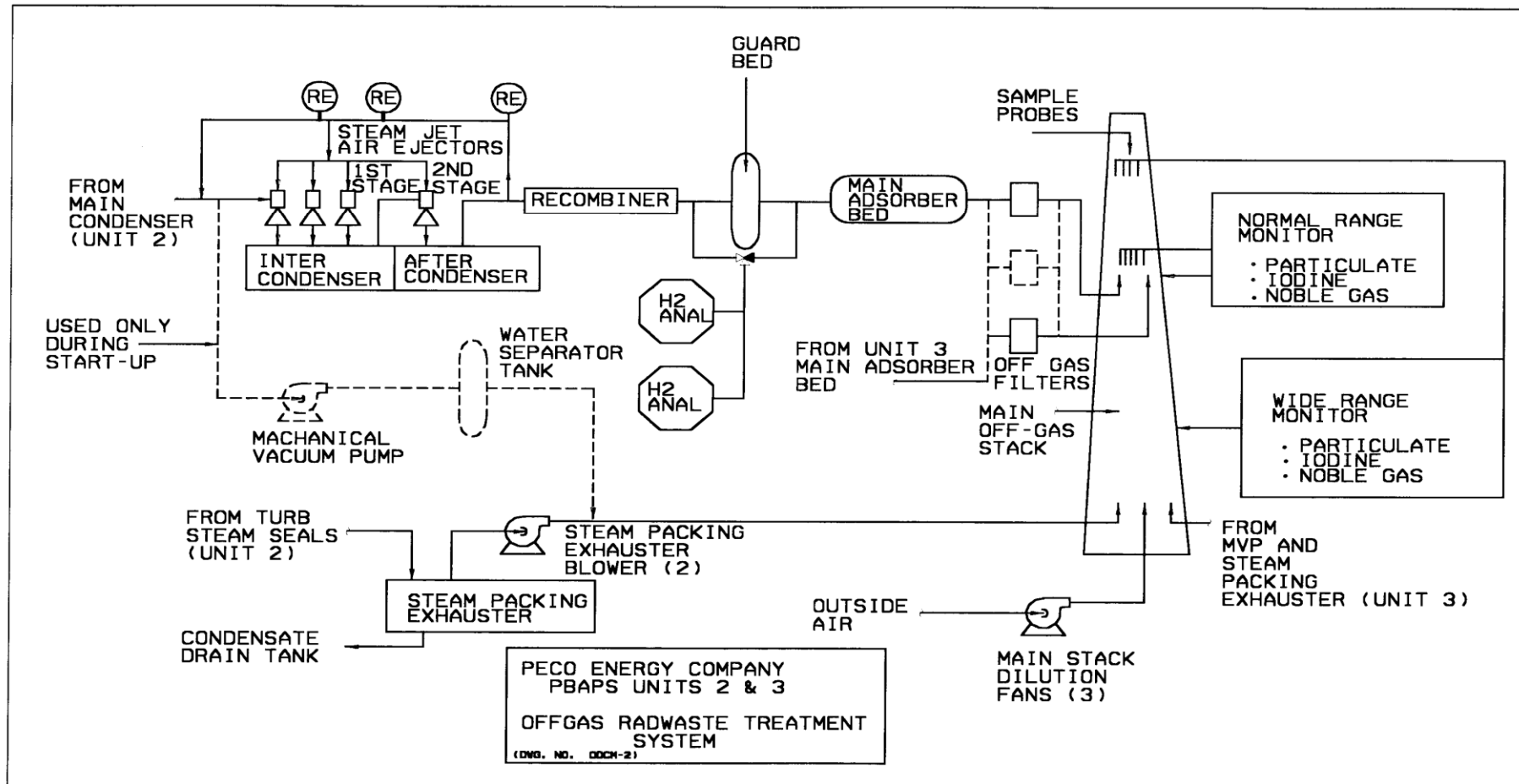


Figure 1

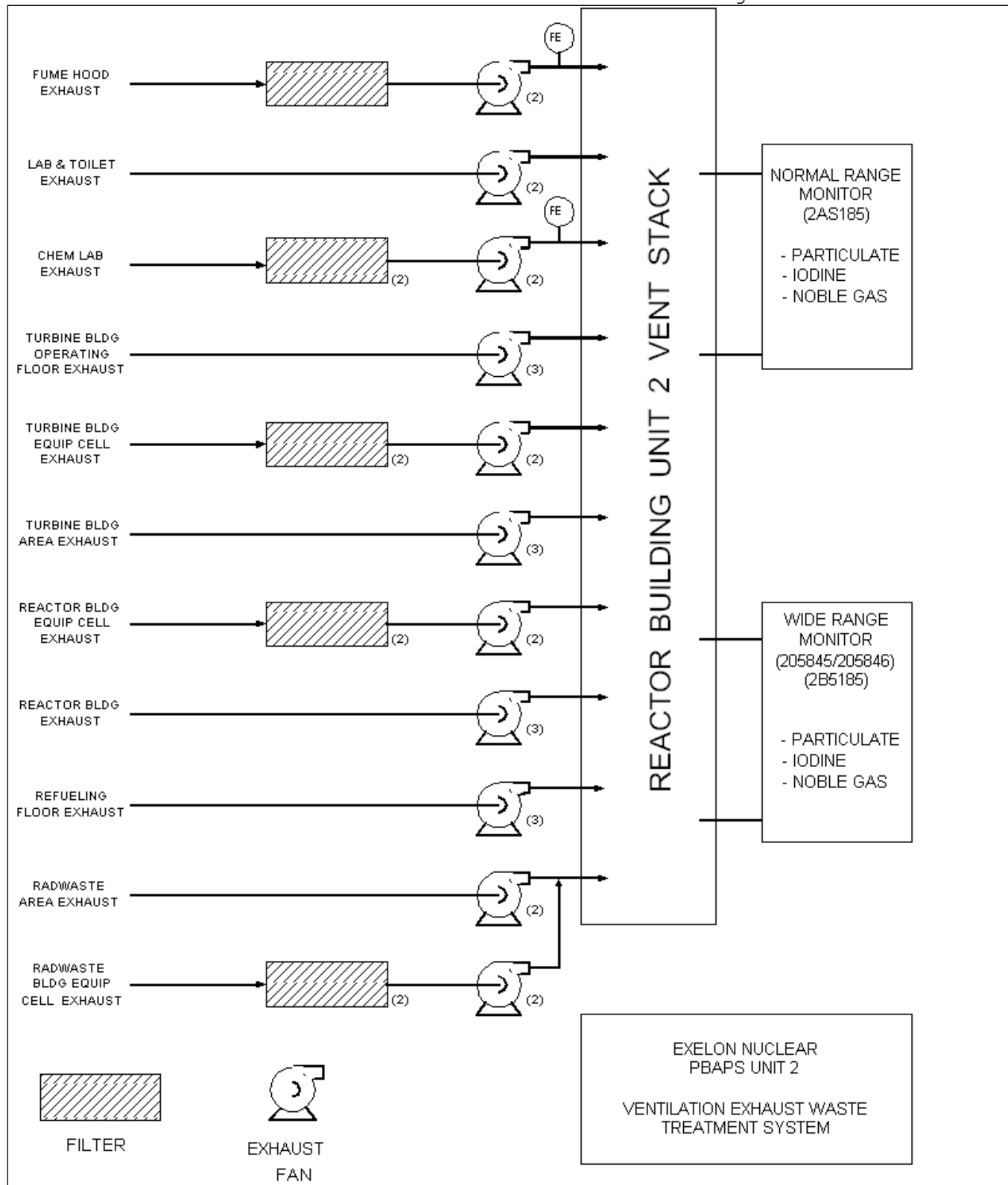


Figure 2

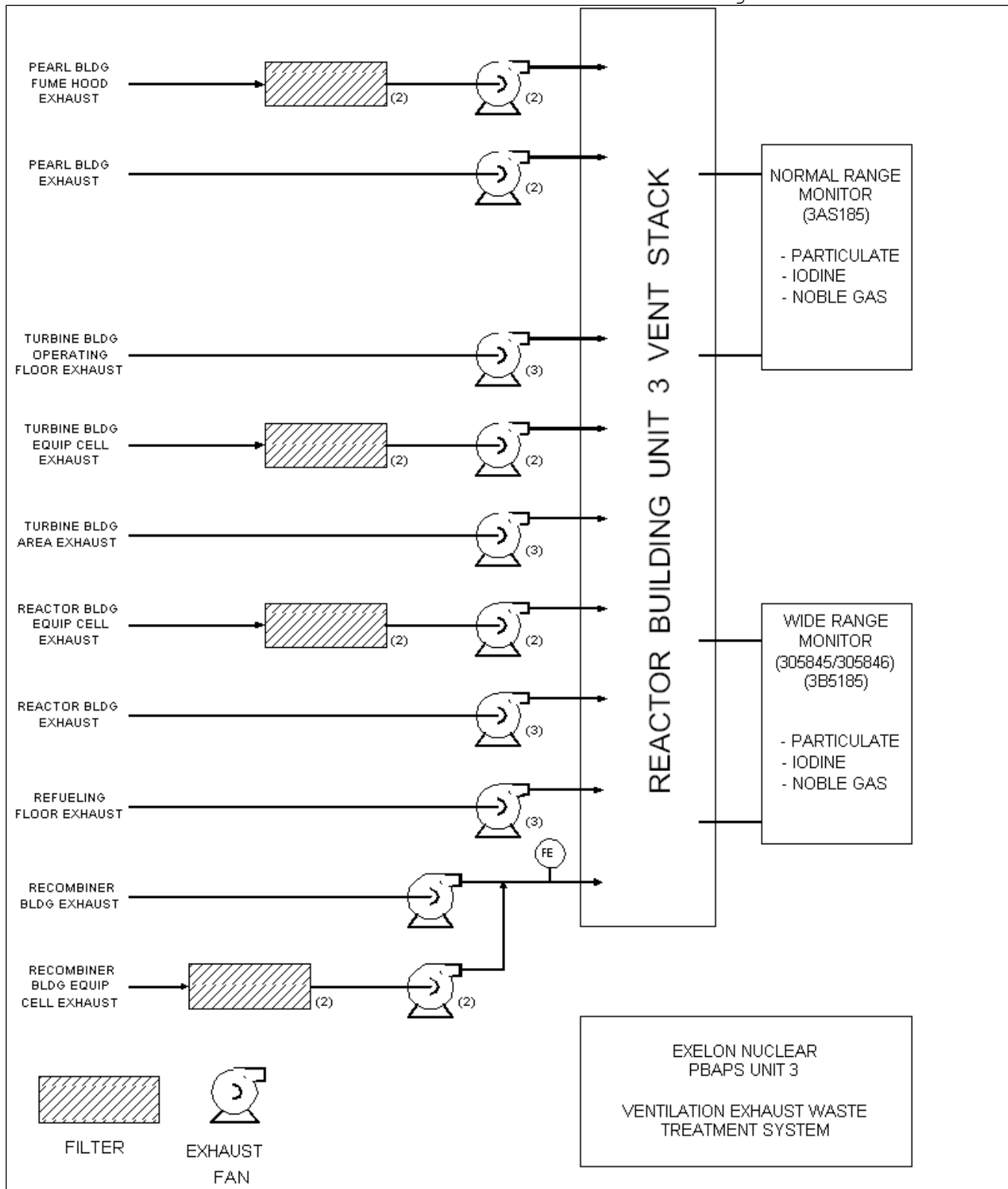
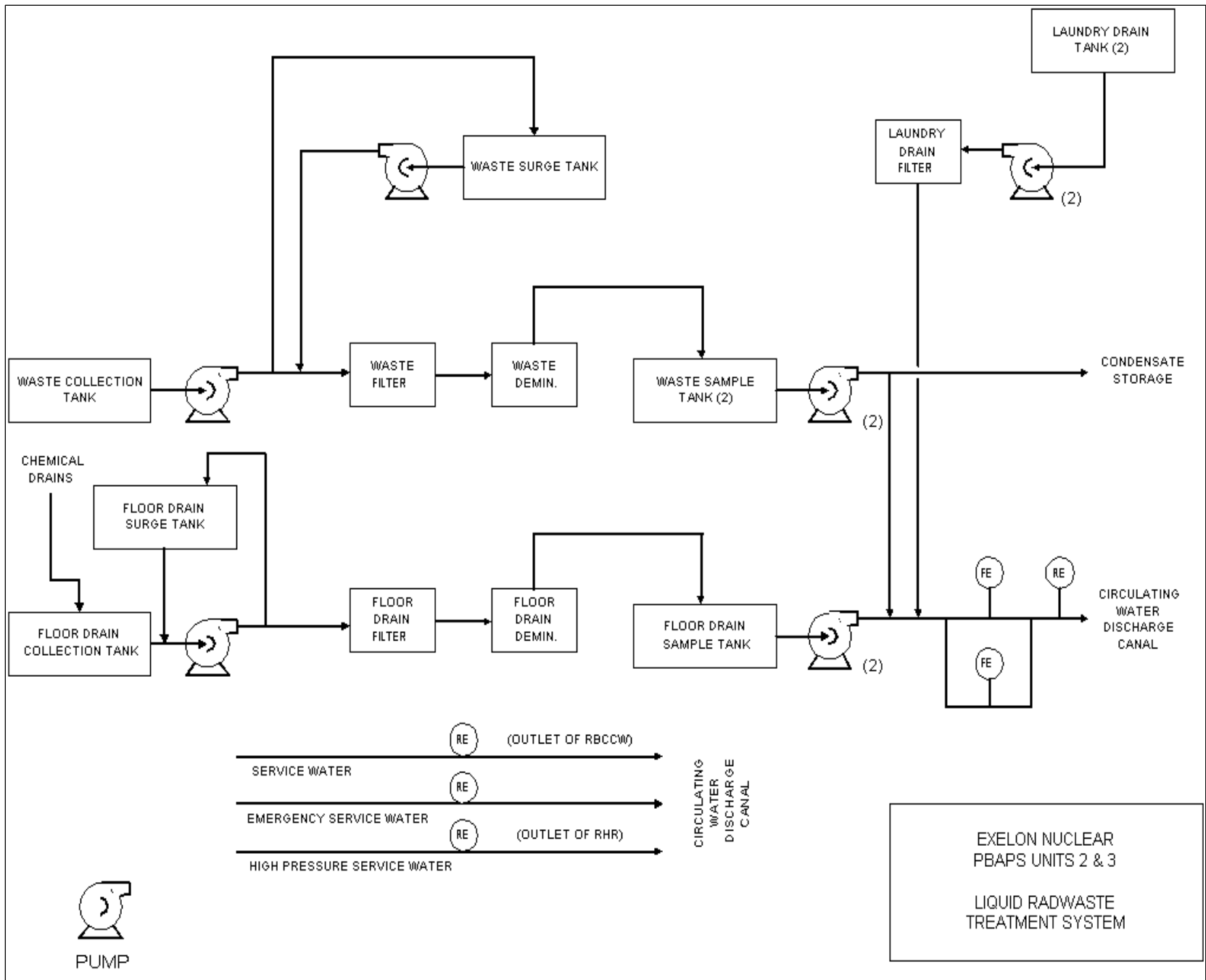


Figure 3

Figure 4



VIII. BasesLiquid Effluent Release Flow Rate Determination

Non-gamma emitting radionuclides (H-3, Fe-55, Sr-89/90) are not detected by the effluent monitor and, therefore, are not directly included in the release flow rate determination.

While tritium accounts for nearly all the activity released, it is not a significant contributor when determining the permissible flow rate. Examining releases over the years 2004 - 2006, the average diluted H-3 contribution to its limiting concentration in liquid effluents was 0.03%. This contribution is not expected to change significantly over time, since the concentration of H-3 in effluents can be expected to remain fairly consistent in effluent releases regardless of fuel conditions, activation product releases, and waste processing.

Based on relative abundances, other non-gamma emitting radionuclides only contributed up to nearly 3 % of the concentration limit. It is reasonable to assume that the abundances of these non-gamma will remain the same relative to other fission and/or activation products under varying conditions. Therefore, under conditions of elevated effluent radionuclide levels, the gamma-emitting radionuclides can be expected to be the main contributors to limiting conditions on liquid effluent concentrations. The maximum permissible release flow rate determination methodology presented in III.A offers an additional factor of conservatism of 30 to 50 which is more than adequate to account for the non-gamma emitting radionuclides.

Site Specific DataNOTE 1

Liquid dose factors,  $A_{ir}$ , for section III.B were developed using the following site specific data. The liquid pathways involved are drinking water and fish.

$$A_{ir} = (U_w D_w + U_F x BF_i) k_0 x DF x RC x e^{-24\lambda_i}$$



- $U_w$  = liters per year; maximum age group usage of drinking water (Reg. Guide 1.109, Table E-5)
- $D_w$  = 5.4; average annual dilution at Conowingo intake
- $U_F$  = kg per year; maximum age group usage of fish (Reg. Guide 1.109, Table E-5)
- $BF_i$  = bioaccumulation factor for nuclide,  $i$ , in freshwater fish. Reg. Guide 1.109, Table A-1, except P-32 which uses a value of  $3.0 \times 10^3$  pCi/kg per pCi/liter.
- $k_0$  =  $1.14 \times 10^5 = (10^6 \text{ pCi}/\mu\text{Ci} \times 10^3 \text{ ml/l}) / 8760 \text{ hr/yr}$  units conversion factor.
- $DF_i$  = dose conversion factor for nuclide,  $i$ , for the age group in total body or organ, as applicable. Reg. Guide 1.109, Table E-11, except P-32 bone which uses a value as indicated below.
- $3.0 \times 10^{-5} \text{ mrem/pCi}$
- $RC$  = 1.16; reconcentration from PBAPS discharge back through PBAPS intake.
- $\lambda_i$  = decay constant for nuclide  $i$ ,  $\text{hr}^{-1}$

The data for  $D_w$  and  $RC$  were derived from data published in Peach Bottom Atomic Power Station Units 2 and 3 (Docket Nos. 50-277 and 50-278) Radioactive Effluent Dose Assessment, Enclosure A, September 30, 1976. All other data except P-32  $BF$  and  $DF$  were used as given in Reg. Guide 1.109, Revision 1, October 1977. The P-32  $BF$  and  $DF$  were used in accordance with information supplied in Branagan, E.F., Nichols, C.R., and Willis, C.A., "The Importance of P-32 in Nuclear Reactor Liquid Effluents", NRC, 6/82. The teen and child dose factors were derived by the ratio of the adult bone dose factors in Reg. Guide 1.109 and Branagan, et al.

NOTE 2

To develop constant R for the ingestion pathway in section IV.C, the following site specific data were used:

$$R_i^C(D/Q) = K' \frac{Q_F(U_{ap})}{\lambda_i + \lambda_w} F_m(r)(DFL_i) \left[ \frac{f_p f_s}{Y_p} + \frac{(1 - f_p f_s) e^{-\lambda_i t_h}}{Y_s} \right] e^{-\lambda_i t_f}$$

where:

- $K'$  =  $10^6$  pCi/ $\mu$ Ci; unit conversion factor
- $Q_F$  = 50 kg/day; cow's consumption rate
- $U_{ap}$  = 330 l/yr; yearly milk consumption by an infant
- $\lambda_i$  = radioactive decay constant for nuclide of interest,  $\text{sec}^{-1}$  (e.g.  $9.97 \times 10^{-7} \text{ sec}^{-1}$  for I-131)
- $\lambda_w$  =  $5.73 \times 10^{-7} \text{ sec}^{-1}$ ; decay constant for removal of activity in leaf and plant surfaces
- $F_m$  = stable element transfer coefficient for nuclide of interest, day/liter (e.g.  $6.0 \times 10^{-3}$  day/liter for I-131)
- $r$  = fraction of deposited nuclide retained in cow's feed grass, 1.0 for radioiodine; 0.2 for particulates
- $DFL_i$  = ingestion dose factor in infant for nuclide of interest, mrem/pCi (e.g.  $1.39 \times 10^{-2}$  mrem/pCi for I-131)
- $f_p$  = 0.6; the fraction of the year the cow is on pasture (average of all farms)
- $f_s$  = 0.487; the fraction of cow feed that is pasture grass while the cow is on pasture (average of all farms)
- $Y_p$  =  $0.7 \text{ kg/m}^2$ ; the agricultural productivity of pasture feed grass
- $Y_s$  =  $2.0 \text{ kg/m}^2$ ; the agricultural productivity of stored feed

$t_f$  =  $1.73 \times 10^5$  sec (2 days); the transport time from pasture, to cow, to milk, to receptor

$t_h$  =  $7.78 \times 10^6$  sec (90 days); the transport time from pasture, to harvest, to cow, to milk, to receptor

NOTE 3

To develop constant R for tritium for the ingestion pathway in section IV.C, the following site specific data were used:

The concentration of tritium in milk is based on the airborne concentration rather than the deposition. The following additional constants and formula are used:

$$R_{H-3}^C (\chi/Q) = K' K''' F_m Q_F U_{ap} (DFL_i) [0.75(0.5/H)]$$

where:

$K'''$  =  $10^3$  gm/kg; a constant of unit conversion

$H$  =  $14.61$  gm/m<sup>3</sup>; absolute humidity of the atmosphere

$0.75$  = the fraction of total feed that is water

$0.5$  = the ratio of the specific activity of the feed grass water to the atmospheric water

NOTE 4

To develop constant R for C-14 for the ingestion pathway in section IV.C, the following site specific data were used:

$$R_{C-14}^{Milk} = K' K''' p F_m Q_F U_{ap} DFL_{C-14} [0.11/0.16]$$

where:

$p$  = the ratio of the total annual release time (for C-14 atmospheric releases) to the total annual time during photosynthesis occurs.

$0.11$  = the fraction of total plant mass that is natural carbon.

$0.16$  = the concentration of natural carbon in the atmosphere, in g/m<sup>3</sup>.

The pathway is the grass-cow-milk ingestion pathway. These data were derived from data published in Peach Bottom Atomic Power Station Units 2 and 3 (Docket Nos. 50-277 and 50-278) Radioactive Effluent Dose Assessment, Enclosure A, September 30, 1976. All other data were used as given in Reg. Guide 1.109, Revision 1, October 1977.

#### ODCMS 4.8.B.2.1, Liquid Pathway Dose Calculations

The equations for calculating the doses due to the actual release rates of radioactive materials in liquid effluents were developed from the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977 and NUREG-0133 "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", October 1978.

#### ODCMS 4.8.C.1.1 and 4.8.C.1.2

##### Dose Rate Noble Gases

The equations for calculating the dose rate due to the actual release rates of radioactive noble gases in gaseous effluents were developed from the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977, NUREG-0133 "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", August 1978, and the atmospheric dispersion model presented in Information Requested in Enclosure 2 to letter from George Lear to E. G. Bauer dated February 17, 1976, September 30, 1976. The specified equations provide for determining the dose rates in areas at and beyond the SITE BOUNDARY based upon the historical average atmospheric conditions.

The dose rate due to noble gas release as calculated by the Gross Release Method is much more conservative than the dose calculated by the Isotopic Analysis Method.

Assuming the release rates given in Radioactive Effluent Dose Assessment, September 30, 1976, the values calculated by the Gross Release Method for total body dose rate and skin dose rate are 6.0 times and 5.7 times, respectively, the values calculated by the Isotopic Analysis Method.

Dose Rate I-131, I-133, Tritium and Radioactive Material  
in Particulate Form.

The model Technical Specification LCO of NUREG-0133 for all radionuclides and radioactive materials in particulate form and radionuclides other than noble gases requires that the instantaneous dose rate be less than the equivalent of 1500 mrem per year.

The release data from 1994 to 1996 were evaluated and the critical organs were determined to be the child thyroid or teenager lung. The child thyroid dose rate is limiting when iodine releases exceed 10 percent of the total release rates. The teenager lung dose rate is limiting when iodine is either not present or a small fraction of the total release.

Because of good fuel performance the amount of I-131 released has decreased. The thyroid may not be the critical organ. When it is not clear which organ dose is limiting, doses for the child thyroid and teenage lung are calculated.

ODCMS 4.8.C.2.1

Dose Noble Gases

The equations for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents were developed from the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977, NUREG-0133 "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", August 1978, and the atmospheric dispersion model presented in Information Requested in Enclosure 2 to letter from George Lear to E. G. Bauer dated February 17, 1976, September 30, 1976. The specified equations provide for determining the air doses in areas at and beyond the SITE BOUNDARY based upon the historical average atmospheric conditions.

The dose due to noble gas releases as calculated by the Gross Release Method is much more conservative than the dose calculated by the Isotopic Analysis Method. Assuming the releases rates given in Radioactive Effluent Dose Assessment, September 30, 1976, the values calculated by the Gross Release Method for total body dose rate and skin dose rate are 4.3 times and 7.2 times, respectively, the values calculated by the Isotopic Analysis Method.

#### ODCMS 4.8.C.3.1

##### Dose, Iodine-131, Iodine-133, Tritium, and Radioactive Material in Particulate Form

The equation for calculating the doses due to the actual release of radioiodines, radioactive material in particulate form, and radionuclides other than noble gases with half-lives greater than 8 days were developed using the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977, NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants", October 1978, and the atmospheric dispersion model presented in Information Requested in Enclosure 2 to Letter from George Lear to E. G. Bauer dated February 17, 1976, September 30, 1976.

These equations provide for determining the actual doses based upon the historical average atmospheric conditions.

Compliance with the 10 CFR 50 limits for radioiodines, radioactive materials in particulate form and radionuclides other than noble gases with half lives greater than eight days is to be determined by calculating the infant thyroid, infant liver and infant bone dose. These organs were determined to be the critical organs based on the release data from 1994 to 1996.

Because of a decrease in the amount of I-131 released, the thyroid may not be the critical organ. The isotopic analysis method is used to calculate dose to the infant thyroid, infant liver and infant bone.