Constellation

May 13, 2022

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Peach Bottom Atomic Power Station Units 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

Subject: Annual Radiological Environmental Operating Report 78
January 1, 2021 through December 31, 2021

In accordance with the requirements of Section 5.6.2 of the Peach Bottom Atomic Power Station (PBAPS), Units 2 and 3 Technical Specifications, this letter submits the Annual Radiological Environmental Operation Report 78. This report provides the 2021 results for the Radiological Environmental Monitoring Program (REMP) as called for in the Offsite Dose Calculation Manual.

In assessing the data collected for the REMP, we have concluded that the operation of PBAPS, Units 2 and 3, had no adverse impact on the environment. There are no commitments contained in this letter.

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/WS/RM/TJH/KH/DLB

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

CCN 22-34

Docket No: 50-277
50-278

PEACH BOTTOM ATOMIC POWER STATION

UNITS 2 and 3

Annual Radiological
Environmental Operating Report

Report No. 78
January 1 through December 31, 2021

Prepared By
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Environmental Services

Peach Bottom Atomic Power Station
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May 2022

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I. Executive Summary

The 2021 Annual Radiological Environmental Operating Report (AREOR) describes the results of the Radiological Environmental Monitoring Program (REMP) conducted for Peach Bottom Atomic Power Station (PBAPS) by Exelon Nuclear and covers the period of 1 January 2021 through 31 December 2021. Throughout that time period, 1,267 analyses were performed on 981 samples. In assessing all the data gathered for this report and comparing the results with preoperational data, it was evident that the operation of PBAPS had no adverse radiological impact on the environment.

The various media collected in the REMP include aquatic, terrestrial, airborne, and ambient radiation. The corresponding analyses performed on the collected specimen were:

Aquatic:

- Surface water samples were analyzed for concentrations of Iodine-131 (I-131), tritium (H-3) and gamma emitting nuclides. All nuclides were below minimum detectable activity.
- Drinking water samples were analyzed for concentrations of gross beta, I-131, H-3, and gamma emitting nuclides. Tritium was detected just above the required lower limit of detection (LLD) of 200 pCi/L in one sample (4L). Gross beta activity was detected, but not above the required LLD of 4 pCi/L and was likely due to background radiation. All other nuclides were below minimum detectable activity.
- Fish and sediment samples were analyzed for concentrations of gamma emitting nuclides. All nuclides were below minimum detectable activity.

Terrestrial:

- Milk samples were analyzed for low level concentrations of I-131 and gamma emitting nuclides. Food product samples were analyzed for concentrations of gamma emitting nuclides. All power production nuclides were below minimum detectable activity.

Airborne:

- Air particulates and air iodine samples were analyzed for gross beta, gamma emitting nuclides, and low level I-131. All nuclides were below minimum detectable activity. The gross beta results were less than the investigation level (1.60E-01 pCi/m^3) and there were no notable differences between control and indicator locations.

Ambient Radiation:

- Ambient gamma radiation levels were measured quarterly. There was no detectable ambient gamma radiation levels to the members of the public at offsite locations, indicating no impact from plant operations. The nearest resident to the ISFSI saw no detectable ambient gamma radiation levels, therefore ISFSI operations did not have an impact to members of the public.

In 2021, the doses from both liquid and gaseous effluents were conservatively calculated for the Maximum Exposed Member of the Public due to PBAPS Operation. Doses calculated were well below all Offsite Dose Calculations Manual (ODCM) limits. The results of those calculations were as follows:

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	mrad
Noble Gas	Beta - Air Dose	8.09E-02	All	1.10E+03	SSE	2.02E-01	4.00E+01	mrad
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	9.82E-05	Adult			4.91E-04	2.00E+01	mrem
Direct Radiation	Total Body	0.00E+00	All	1.19E+03	SSE	0.00E+00	2.50E+01	mrem
40 CFR Part 190 Compliance								
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	4.7E+00	3.00E+00	mrem
Total Dose	Thyroid	1.27E-01	All	1.19+03	SSE	2.30E-01	5.50E+01	mrem

II. Introduction

PBAPS is located along the Susquehanna River between Holtwood and Conowingo Dams in Peach Bottom Township, York County, Pennsylvania. PBAPS Units 2 and 3 are boiling water reactors, each with a rated full-power output of approximately 4,016 MWth while Unit 1 is a decommissioned 115 MWth High Temperature, Gas-cooled Reactor (HTGR). The initial environmental monitoring program began 5 February 1966. A summary of the Unit 1 preoperational monitoring program was presented in a previous report (1). Preoperational summary reports (2,3) for Units 2 and 3 have been previously issued and summarize the results of all analyses performed on samples collected from 5 February 1966 through 8 August 1973.

The sampling and analysis requirements are contained in the PBAPS ODCM and the ODCM Specifications (ODCMS). This AREOR covers those analyses performed by Teledyne Brown Engineering (TBE), Landauer, Exelon Industrial Services (EIS) and GEL Laboratories on samples collected during the period 01 January 2021 through 31 December 2021.

A. Objectives

The objectives of the REMP are:

1. Provide data on measurable levels of radiation and radioactive materials in the publicly-used environs;
2. Evaluate the principal pathways of exposure to the public as described in the ODCM and determine the relationship between quantities of radioactive material released from the plant and resultant radiation doses to members of the public.

B. Implementation of the Objectives

Implementation of the objectives is accomplished by:

1. Identifying significant exposure pathways,
2. Establishing baseline radiological data of media within those pathways,
3. Continuously monitoring those media before and during plant operation to assess station radiological effects (if any) on man and the environment.

As the REMP is established to measure the impact of power plant operations (release of radionuclides) on man and the environment; it is important to understand radiation/radioactivity, the units used to measure them, and natural sources of radiation in the environment. A brief explanation is provided to differentiate between radiation from nuclear power production and other sources, be they man-made or natural. The doses produced from the other sources of radiation can be compared to the data presented in this report.

C. Radiation and Radioactivity

All matter is made of atoms. An atom is the smallest part into which

matter can be broken down and still maintain all its chemical properties. Nuclear radiation is energy, in the form of waves or particles that is given off by unstable, radioactive atoms. Radioactive material exists naturally and has always been a part of our environment. The earth's crust, for example, contains radioactive uranium, radium, thorium and potassium. Some radioactivity is a result of nuclear weapons testing. Examples of radioactive fallout that is normally present in environmental samples are cesium-137 (Cs-137) and strontium-90 (Sr-90). Some examples of radioactive materials released from a nuclear power plant are Cs-137, I-131, Sr-90 and cobalt-60 (Co-60).

Radiation is measured in units of millirem (mrem); much like temperature is measured in degrees. A millirem is a measure of the biological effect of the energy deposited in tissue. The natural and man-made radiation dose received in one year by the average American is 300 to 400 mrem (References 5, 6, 7 in Table 1 below). Radioactivity is measured in curies. A curie is that amount of radioactive material needed to produce 3.70E+10 nuclear disintegrations per second. This is an extremely large amount of radioactivity in comparison to environmental radioactivity. That is why radioactivity in the environment is measured in picocuries. One picocurie is equal to 1.00E-12 (one trillionth) of a curie.

D. Sources of Radiation

As mentioned previously, naturally occurring radioactivity has always been a part of our environment. Table I shows the typical doses received from natural and man-made sources.

Table 1

Radiation Sources and Corresponding Doses [4]

NATURAL		MAN-MADE	
Source	Radiation Dose (mrem/yr)	Source	Radiation Dose (mrem/yr)
Internal, inhalation [5]	228	Medical [6]	300
External, space	33	Consumer [7]	13
Internal, ingestion	29	Industrial[8]	0.3
External, terrestrial	21	Occupational	0.5
		Weapons Fallout	<1
		Nuclear Power Plants	<1
Approximate Total	311	Approximate Total	314

Cosmic radiation from the sun and outer space penetrates the earth's atmosphere and continuously bombards us with rays and charged particles. Some of this cosmic radiation interacts with gases and particles in the atmosphere, making them radioactive in turn. These radioactive byproducts from cosmic ray bombardment are referred to as cosmogenic radionuclides. Isotopes such as beryllium-7 (Be-7) and carbon-14 (C-14) are formed in this way. Exposure to cosmic and cosmogenic sources of radioactivity results in a dose of 33 mrem/yr.

Additionally, natural radioactivity is in our body, in the food we eat (about 29 mrem/yr), in the ground we walk on (about 21 mrem/yr), and in the air we breathe (about 228 mrem/yr). One percent of all potassium in nature is the radioactive potassium-40 (K-40). The majority of a person's annual dose results from exposure to radon and thoron in the air we breathe. These gases and their radioactive decay products arise from the decay of naturally occurring uranium, thorium and radium in soil and in building products such as brick, stone and concrete. Radon and thoron levels vary greatly with location, primarily due to changes in the concentration of uranium and thorium in the soil. Residents at some locations in Colorado, New York, Pennsylvania, and New Jersey have a higher annual dose as a result of higher levels of radon/thoron gases in these areas. In total, these various sources of naturally occurring radiation and radioactivity contribute to a total dose of about 311 mrem per year (mrem/yr).

In addition to natural radiation, we are normally exposed to radiation from a number of man-made sources. The single largest dose from man-made sources result from therapeutic and diagnostic applications of x-rays and radiopharmaceuticals. The annual dose to an individual in the U.S. from medical and dental exposure is about 300 mrem. Consumer products, such as televisions and smoke detectors, contribute about 13 mrem/yr. Much smaller doses result from weapons fallout and nuclear power plants (less than 1 mrem/yr). Typically, the average person in the United States receives about 314 mrem/yr from man-made sources.

Some of the natural radioactive nuclides discussed above were identified in PBAPS REMP samples. The typical power production radionuclides, described in the next sections, were not identified and thus it can be concluded that PBAPS did not impact man and the environs during the 2021 operating period.

III. Program Description

A. Sample Collection

Exelon Industrial Services (EIS) collected samples for the REMP for PBAPS Exelon Nuclear. This section describes the collection methods used by EIS to obtain environmental samples for the PBAPS REMP in 2021. Sample locations and descriptions can be found in Table B-1 and Figures B-1 through B-3, Appendix B. The collection procedures used by EIS are listed in Table B-2, Appendix B.

<u>Aquatic Environment</u>

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, fish and sediment. Surface water is sampled from two locations as prescribed by the ODCM: one upstream (1LL) and one downstream (1MM) of the plant discharge canal. Drinking water is sampled from a control location (6I) and up to 3 locations nearest to public drinking water supplies. Two locations are identified in the ODCM as the closest drinking water supplies, the Conowingo Dam (4L) and Chester Water Authority (13B). All samples were collected weekly by automatic sampling equipment or as grab samples. Weekly samples from each location were composited into two one-gallon monthly samples for analysis. A separate quarterly composite of the monthly samples was also collected.

Fish sample collection locations required by the ODCM are in an area close to the discharge of PBAPS (4) and a control location, unaffected by plant discharge (6). These samples were comprised of the flesh of commercially and recreationally important species specific to the environs around PBAPS. Fish samples were collected semiannually from two groups: Bottom Feeder (channel catfish, flathead catfish and carp) and Predator (smallmouth and hybrid striped bass), as these are the types of fish commonly collected by the public from the river around PBAPS. The total weight of fish flesh was approximately 1000 grams. The samples were preserved on ice for shipping to the laboratory.

The ODCM requires one sediment sample to be collected downstream of the plant in an area with existing or potential recreational value. The REMP collects samples from three locations (4J, 4T and 6F; 6F is the control). Sediment samples, composed of recently deposited substrate, were collected semiannually. Multiple grab samples of the sediment were collected to obtain an approximately homogenous, representative sample totaling 1000 grams.

<u>Terrestrial Environment</u>

The terrestrial environment was evaluated by performing radiological analyses on milk and food product samples. The ODCM requires milk samples at three locations with the highest dose potential, within three miles of PBAPS and one sample at a control location. The REMP meets these requirements and samples extra locations. Milk samples were collected

biweekly at five locations (J, R, S, X and V; V is the control) from April through November, when the cows were on pasture, and monthly from December through March, when the cows were primarily on feed. Six additional locations (C, D, E, P, W and Y; C and E are the controls) were sampled quarterly. Two-gallon samples were collected directly from the bulk tank at each location, preserved with sodium bisulfite, and shipped promptly to the laboratory.

The ODCM requires food products to be collected from the area of highest dose impact and a control location if milk sampling is unavailable in those locations. Milk sampling occurs in most every sector, except for SSE, S and WSW, where gardens are established for sampling. Food product samples, comprised of annual broad green leaf vegetation, were collected monthly at four locations (1C, 2Q, 3Q and 55; 55 is the control) from June through September. Typically, the ‘planting’ season starts late April/early May, with the plants gaining sufficient mass for collection in late June or July. Approximately 1000 g of unwashed samples were collected in plastic bags and shipped promptly to the laboratory, but sample size varied on garden production.

Airborne Environment

The airborne atmospheric environment was evaluated by performing radiological analyses on air particulate and radioiodine samples. The ODCM requires sampling from five locations, including three site boundary locations with greatest dose impact, one location within a local community with the highest dose impact, and one control location. Air particulate and radioiodine samples were collected and analyzed weekly from five locations (1B, 1C, 1Z/1A, 3A and 5H2; 5H2 is the control, 1A is the duplicate QA location). Airborne iodine and particulate samples were obtained at each location using a vacuum pump to pull air through a glass fiber filter and charcoal cartridge. The pumps were run continuously and sampled air at the rate of approximately 1 cubic foot per minute to obtain a minimum total volume of 280 cubic meters. The weekly filters were composited for a quarterly sample.

Ambient Gamma Radiation

The ambient gamma radiation in the areas surrounding PBAPS is measured using dosimeters, which are exposed to ambient radiation in the field and exchanged quarterly. The ODCM requires at least 40 routine monitoring stations with two or more dosimeters at each location for continuous monitoring. The REMP contains 48 dosimeter monitoring locations.

Optically-Stimulated Luminescent Dosimeters (OSLD) replaced the Thermo-Luminescent Dosimeter (TLD) starting in 2012. However, PBAPS continued using TLD in addition to OSLD to compare the two technologies, although only the OSLD data is reported. TLD field deployment was discontinued in 2021.

The OSLD locations were placed on and around the PBAPS site as follows:

Site boundary monitoring consists of 19 locations (1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 1I, 1J, 1K, 1L, 1M, 1NN, 1P, 1Q, 1R, 2, and 40), near and within the site perimeter representing fence post doses (i.e., at locations where the doses will be potentially greater than maximum annual off-site doses).

Intermediate distance monitoring consists of 23 locations (14, 15, 17, 22, 23, 26, 27, 31A, 32, 3A, 42, 43, 44, 45, 46, 47, 48, 49, 4K, 5, 50, 51 and 6B), extending to approximately 5 miles from the site and designed to measure possible exposures to close-in population.

Six locations (16, 18, 19, 24, 2B and 1T) represent control and special interests areas such as population centers, schools, and nearest residents.

The specific dosimeter locations were determined by the following criteria:

1. The presence of relatively dense population, nearby residences, schools, and control locations;
2. Site meteorological data taking into account distance and elevation for each of the sixteen 22.5 degree sectors around the site, where estimated annual dose from PBAPS, if any, would be more significant;
3. And on hills free from local obstructions and within sight of the vents (where practical).

Each dosimetry location in the environment has 2 OSLD and 2 TLD dosimeters which were enclosed in plastic as a moisture barrier. Dosimeter housing are mesh plastic tubes, aligned horizontally and oriented such that dosimeter windows face the plant. Dosimeters themselves were placed vertically in the tubes so that no dosimeter was covered by another dosimeter and all dosimeters properly faced the plant.

B. Sample Analysis

This section describes the analytical methods used by TBE, EIS and GEL Labs to analyze the environmental samples for radioactivity. The analytical procedures used by the laboratories are listed in Table B-2, Appendix B.

The required OCDM analyses include:

1. Concentrations of beta emitters in drinking water and air particulates;
2. Concentrations of gamma emitting nuclides in surface and drinking water, air particulates, milk, fish, sediment and food products;
3. Concentrations of tritium in surface and drinking water;
4. Concentrations of I-131 in air, milk, and food products. Although not required by the ODCM, I-131 is also analyzed in drinking and surface water;
5. Ambient gamma radiation levels at various site environs.

C. Data Interpretation

The radiological environmental and direct radiation data collected prior to PBAPS becoming operational was used as a baseline with which the 2021 operational data were compared. In addition, data were compared to previous years' operational data for consistency and trending. Several factors are important in the interpretation of the data.

1. <u>Lower Limit of Detection and Minimum Detectable Concentration</u>

The lower limit of detection (LLD) is defined as the smallest concentration of radioactive material in a sample that would yield a net count (above background) that would be detected with only a 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is intended as a "before-the-fact" (*a priori*) estimate of a system (including instrumentation, procedure and sample type) and not as an "after-the-fact" (*a posteriori*) measurement. All analyses are designed to achieve the required detection limits for environmental samples, as described in the PBAPS ODCM.

The minimum detectable concentration or activity (MDC or MDA) is defined as the "after-the-fact" (*a posteriori*) estimate determined during the analysis of the sample.

2. <u>Net Activity Calculation and Reporting of Results</u>

Net activity for a sample is calculated by subtracting background activity from the sample activity. Since the REMP measures extremely small changes in radioactivity in the environment, background variations can result in sample activity being lower than the background activity causing a negative number. MDC is reported in all cases where positive activity was not detected. In previous years, when net activity was reported, a lower baseline is seen in trending when compared to 2021 results.

Gamma spectroscopy results for each type of sample were grouped as follows:

- For surface and drinking water, twelve nuclides, manganese-54 (Mn-54), cobalt-58 (Co-58), iron-59 (Fe-59), cobalt-60 (Co-60), zinc-65 (Zn-65), niobium-95 (Nb-95), zirconium-95 (Zr-95), I-131, cesium-134 (Cs-134), Cs-137, barium-140 (Ba-140), and lanthanum-140 (La-140) were reported.
- For fish, eight nuclides, K-40, Mn-54, Co-58, Fe-59, Co-60, Zn-65, Cs-134 and Cs-137 were reported.
- For sediment, six nuclides, K-40, Mn-54, Co-58, Co-60, Cs-134 and Cs-137 were reported.
- For air particulates, six nuclides, Be-7, Mn-54, Co-58, Co-60, Cs-134 and Cs-137 were reported.

- For milk, six nuclides, K-40, I-131, Cs-134, Cs-137, Ba-140 and La-140 were reported.
- For food products, eight nuclides, Be-7, K-40, Mn-54, Co-58, Co-60, I-131, Cs-134 and Cs-137 were reported.

Positive activity values (greater than MDC) were recorded and the mean and two standard deviation of the results were calculated. The standard deviation represents the variability of measured results for different samples of the same media rather than a single analysis uncertainty.

D. Program Exceptions

For 2021, the PBAPS REMP had a sample collection recovery rate of > 99%. The exceptions to this program are listed below:

Table 2 LIST OF SAMPLE ANOMALIES

Sample Type	Location Code	Collection Date(s)	Reason
Food Products	55	September, 2021	Only one vegetation species produced due to farm owner cutting down plants and tilling (IR4451358)
Water	13B	10/19 - 10/25	No sample produced due to Chester Water Authority station being down for maintenance (IR4454201)

Table 3 LIST OF MISSING SAMPLES

Sample Type	Location Code	Collection Date(s)	Reason
AP/AI*	1Z & 1A	09/08-09/21	Loss of power from a downed power line (IR4446927)

**AP/AI = Air Particulates/Air Iodine*

Each program exception was reviewed to understand the causes of the program exception, and to implement corrective actions as necessary. Sampling and maintenance errors were reviewed with the personnel involved to prevent a recurrence. Occasional equipment breakdowns and power outages were unavoidable.

IV. Program Changes

Milk Farm U was removed from the program and replaced with Farm S (19100 ft SE of site). Farm S had been in the program but was not in the ODCM. This change was made because Farm U no longer wished to participate in the REMP. There were no other program changes in 2021.

V. Results and Discussion

Appendix A contains a summary of all 2021 PBAPS REMP results which meets the requirement of Table 3 of NUREG 1302 'Branch Technical Position Paper'[9]. Table A-1 lists results by each sample media and analyses performed. The total number of analyses performed, required LLD, the number of positive results for each indicator and control location are also listed. From the positive results identified (greater than the MDA) the mean value, range and station locations with highest annual mean are listed. Commonly-identified nuclides are gross beta, K-40, and Be-7.

A. Aquatic Environment

1. Surface Water

A summary of the 2021 analysis results for surface water samples from stations 1LL and 1MM are listed below:

Tritium

Quarterly samples were analyzed for tritium activity. No tritium activity was detected and the required LLD was met.
(Table C-I.1, Appendix C)

Iodine

Monthly samples were analyzed for low level I-131. All results were less than the MDC and the required LLD was met.
(Table C-I.2, Appendix C)

Gamma Spectrometry

Monthly samples were analyzed for gamma emitting nuclides. All nuclides were less than the MDC and all required LLDs were met.
(Table C-I.3, Appendix C)

2. Drinking Water

The results from the drinking water samples collected in 2021 from stations 13B, 4L and 6I are described below:

Gross Beta

Samples from all locations were analyzed monthly for concentrations of gross beta activity (Table C-II.1 and Figure C-1 Appendix C). Gross beta activity was detected in 18 of 36 samples. The values ranged from 1.8 to 3.7 pCi/L with a mean value of 2.4 ± 1.5 pCi/L. The mean detected gross beta activity was less than the required LLD (4 pCi/L) which indicates that the measurement technique was even more sensitive than required. The detectable gross beta activity was well below the procedural investigation level (15 pCi/L). Concentrations detected were generally below those detected in previous years.

Tritium

Monthly samples were composited quarterly and analyzed for tritium activity. Tritium activity was detected in 1 of 12 samples at a concentration of 202 pCi/L. All other samples were less than required MDC (200 pCi/L) and the required LLD was met. (Table C-II.2, Appendix C)

Iodine

Monthly samples were analyzed for low level I-131. All results were less than the MDC and the required LLD was met. (Table C-II.3, Appendix C)

Gamma Spectrometry

Samples from the three locations were analyzed monthly for gamma emitting nuclides. All nuclides were less than the MDC and all required LLDs were met. (Table C-II.4, Appendix C)

3. Fish

Results from fish samples collected at locations 4 and 6 in 2021 are described below:

Gamma Spectrometry

The edible portions of the collected fish samples were analyzed semiannually for gamma emitting nuclides (Table C-III.1, Appendix C). Naturally occurring K-40 was found at all stations and ranged from 2,166 to 4,250 pCi/kg (wet), with a mean value of 3,091 ± 1,219 pCi/kg (wet), consistent with levels detected in previous years. No fission or activation products, due to plant operations were found in 2021 and all required LLDs were met. Figure C-2, Appendix C, displays the various gamma radionuclide MDC results for locations 4 and 6, based on the type of fish collected. All MDC results are less than the nuclide-specific LLDs. The last 15-year average Cs-137 MDC is also shown to trend 2021 results with historical results. There have been no detectable levels of Cs-137 in fish since 1983.

4. Sediment

Sediment samples were collected at locations 6F, 4J, and 4T and the results are described below:

Gamma Spectrometry

Sediment samples were analyzed for gamma emitting nuclides (Table C-IV.1, Appendix C). K-40 was found in all locations and ranged from 11,310 to 23,170 pCi/kg (dry) with a mean value of 15,150 ± 9,067 pCi/kg (dry). No fission or activation products were found and all LLDs were met. The Cs-137 MDC results are displayed in Figure C-3, Appendix C, along with the 20-year average results.

B. Atmospheric Environment

1. Airborne Particulates

Continuous air particulate samples were collected from five locations. The five locations were separated into three groups: Group I represents locations within the PBAPS site boundary (1B, 1C and 1Z/1A), Group II represents the location of the closest local community (3A) and Group III represents the control location at a remote distance from PBAPS (5H2). 1A results are discussed in Section H, Secondary Laboratory Analysis. The results from samples collected in 2021 are described below:

Gross Beta

Weekly samples were analyzed for concentrations of beta- emitters (Tables C-V.1, Appendix C). Detectable gross beta activity was observed at all locations. Onsite results ranged from 7E-3 to 44E-3 pCi/m^3, with a mean of 19E-3 ± 13E-3 pCi/m^3. The results from local communities ranged from 10E-3 to 39E-3 pCi/m^3 with a mean of 22E-3 ± 13E-3 pCi/m^3. The control results ranged from 7E-3 to 38E-3 pCi/m^3 with a mean of 19E-3 ± 14E-3 pCi/m^3.

The range of detectable results and mean value from all locations are the same within error, indicating the gross beta activity is not a result of the operation of PBAPS, as shown in Figure C-4, Appendix C. In addition, a comparison of the 2021 air particulate data with historical data indicates a decreasing trend in gross beta activity since initial operation of the plant (Figure C-4, Appendix C).

Gamma Spectrometry

Quarterly samples were analyzed for gamma emitting nuclides (Table C-V.2, Appendix C). Naturally occurring Be-7 activity, from cosmic rays, was detected in all 20 samples. The values ranged from 54E-3 to 130E-3 pCi/m^3, with a mean value of 87E-3 ± 34E-3pCi/m^3. All power production nuclides were less than the MDC and all required LLDs were met.

2. Airborne Iodine

Weekly samples were also analyzed for low-level I-131. All results were less than the MDC for I-131 and the required LLD was met. (Table C-VI.1, Appendix C)

C. Terrestrial

1. Milk

During 2021, 150 milk samples were collected and analyzed from the following locations: D, J, P, R, S, W, X, Y (indicators) and C, E, V (controls). The results are described below:

Iodine-131

Milk samples from all locations were analyzed for concentrations of I-131 (Tables C-VII.1, Appendix C). All results were less than the MDC for I-131 and all required LLDs were met. Figure C-5 displays the 2021 milk I-131 results for both indicator and control locations. All results are less than the LLD (1 pCi/L) and much less than the reporting level (3 pCi/L).

Gamma Spectrometry

Milk samples from all locations were analyzed for concentrations of gamma emitting nuclides (Table C-VII.2, Appendix C). Naturally occurring K-40 was found in all samples and ranged from 973 to 1,871 pCi/l, with a mean value of 1242 ± 315 pCi/L. All other nuclides were less than the MDC and all required LLDs were met.

2021 Cs-134 and Cs-137 MDC results are plotted in Figure C-5 with the required LLDs and Reporting Levels. All results are much less than the LLDs and reporting levels. The last 15-year average MDC of Cs-137 in milk is also plotted in Figure C-5, Appendix C. There is no statistical difference between the 2021 MDC Cs-137 results and the 15-year historical MDC.

2. Food Products

Throughout 2021, 46 samples of various green leafy vegetation (Swiss chard, cabbage, collards, kale, broccoli, etc.) were collected and analyzed for concentrations of gamma emitting nuclides (Table C-VIII.1, Appendix C). The results are discussed below:

Gamma Spectrometry

Naturally occurring Be-7 activity was found in 23 of 46 samples and ranged from 269 to 4,611 pCi/kg (wet), with a mean of 887 ± 3,950 pCi/kg (wet). Also, naturally occurring K-40 activity was found in all samples and ranged from 1,142 to 9,617 pCi/kg (wet), with a mean of 4,526 ± 3,399 pCi/kg (wet). All power production nuclides were less than the MDC and all required LLDs were met.

D. Ambient Gamma Radiation

Results of OSLD measurements are listed in Tables C-IX.1 and C-IX.2 and Figure C-6, Appendix C.

In 2019, six years of OSLD data (2012-2018) were re-evaluated with the new methodology presented in Exelon corporate procedure CY-AA-170-1001, in order to determine a background dose and baseline for each location in the REMP. Detectable Facility Dose is any normalized net dose above the sum of the normalized mean background dose and minimum differential dose ($B_{Q/A}$ + $MDD_{Q/A}$) and is reported both quarterly and annually for each location. Only Quarterly and Annual Normalized Net Dose for each location is reported in Table C-IX.1 and C-IX.2.

The net dose is calculated by subtracting a control transit dosimeter and extraneous dose rather than a control or background location dose. The net dose is normalized to a standard 91-day quarter rather than previously reported monthly doses. Figure C-6 displays the B_A + MDD_A for each location as a dash mark, and the annual normalized net dose is shown as a column graph. Any column above the dash mark, would indicate annual positive facility related dose.

One location (1L) had positive quarterly facility dose (6.2 mrem) in the 2nd quarter and positive annual facility dose (17.4 mrem/yr). This location is at the site boundary by the river and elevated dose was due to equipment moves and there was no impact on dose to members of the public. All other locations showed no normalized net quarterly dose above the B_A + MDD_A, therefore, there is no detectable ambient gamma radiation to the members of the public due to PBAPS operations.

E. Independent Spent Fuel Storage Installation (ISFSI)

ISFSI was initiated in June 2000. Site boundary OSLDs which measure the ambient gamma radiation closest to ISFSI are locations 1A, 1D, 1M, 1P, 1Q, 1R, with 1R being the closest. Location 2B is the nearest real resident which could be impacted by ISFSI. Location 2B, follows closely with values from locations 1A, 1D and controls, indicating no impact from ISFSI on nearest real resident. Data from location 2B is used to demonstrate compliance to both 40CFR190 and 10CFR72.104 limits. All radiation levels are well below regulatory limits.

In 2019, a six year data set (2012-2018) was used to determine the background dose at each location. In 2021, there was no detectable facility-related dose at any location. Detectable facility-related dose at 1R in the 3Q of 2019 (6.4 mrem/std. qtr), lead to detectable annual facility-related dose (15.5 mrem/yr). This was the first time PB reported facility-related dose due to ISFSI, which was expected due to the increasing trends seen at 1R over the years.

Also in 2019, the ISFSI pad was filled with its last TN-68 cask. Construction began in 2020 on a second ISFSI pad which was loaded with Holtec casks. Facility-related dose is expected to increase due to the second ISFSI pad, but still remain below the 40CFR190 and 10CFR72.104 limits.

F. Land Use Census

A Land Use Survey, conducted during the fall of 2021, was performed by Exelon Industrial Services (EIS), to comply with Section 3.8.E.2 of PBAPS's ODCM Specifications. The survey documented the nearest milk-producing and meat animal, nearest residence, and garden larger than 500 square feet in each of the sixteen meteorological sectors out to five miles.

Also, because PBAPS is an elevated release facility, an additional requirement of identifying all gardens larger than 500 square feet and every dairy operation within three (3) miles was included in the survey. The

distance and direction of all locations were positioned using Global Positioning System (GPS) technology. The results of this survey are summarized below.

There was no change in nearest residents compared to the 2020 report. There were gardens identified in all sectors except the NNW sector. Ten (10) new gardens were located this year in S, SSW, WSW, W, WNW and NW sectors within three (3) miles of the Peach Bottom release vents. The nearest gardens in the NW sector has been updated from the 2020 report; all other sectors are the same as in the 2020 report.

Animals used for meat consumption were identified in all 16 sectors. Four (4) new sites were identified this year in SSE, SSW, W and WNW sectors, with the nearest meat animal in the SSE sector and has been updated from the 2020 report. The nearest animal in all other sectors remains the same as in last year's report. Dairy sites were identified in 12 of 16 sectors. There were no new dairy sites there were no changes in nearest milk-producing animal in any sector.

Location of the Nearest Residence, Garden, Milk, Meat, Animal within a Five-Mile Radius of PBASP Reactor Building Exhaust Vents

	Sector	Residence Feet	Garden Feet	Milk Farm Feet	Meat Animal Feet
1	N	12,362	14,003	14,183	14,183
2	NNE	11,112	11,041	10,843	10,843
3	NE	10,080	10,004	10,492	10,080
4	ENE	10,495	11,554	10,925*	10,925
5	E	10,066	14,540	14,471	13,712
6	ESE	16,085	19,109	20,154	16,085
7	SE	10,772	10,772	19,134*	19,134
8	SSE	3,912	3,912	-	14,392
9	S	5,545	5,545	-	9,247
10	SSW	6,072	6,418	11,602	7,187
11	SW	4,755	4,865	4,860*	4,860
12	WSW	4,036	7,487	-	4,204
13	W	5,327	5,327	5,136*	5,136
14	WNW	2,928	4,192	22,124	3,926
15	NW	2,948	7,429	9,545	7,582
16	NNW	5,124	-	-	5,124

*Farm included in the REMP

G. Errata Data

There was no errata data for 2021.

H. Secondary Laboratory Analysis

Appendix D of this report presents the results of data analyses performed by the QC laboratory, EIS and GEL. Duplicate samples were obtained from several locations and analyzed by both the primary and QC laboratories. GEL was only used for H-3 analyses of water samples because EIS could not perform those analyses. Comparisons of the results for all media were within expected ranges. (Figures D-1 and D-2)

I. Summary of Results – Quality Control (QC) Laboratory Analysis

The primary and secondary laboratories analyzed Performance Evaluation (PE) samples of air particulate, air iodine, milk, soil, food products and water matrices (Appendix E). The PE samples, supplied by Eckert & Ziegler Analytics, Inc., Environmental Resource Associates (ERA) and DOE's Mixed Analyte Performance Evaluation Program (MAPEP), were evaluated against a pre-set acceptance criteria described in Appendix F.

For the Teledyne Brown Engineering (TBE) laboratory, 146 out of 154 analyses performed met the specified acceptance criteria. Seven analyses (water - Fe-55, Gross Beta (2), H-3; AP - Gross Alpha, soil - Ni-63 (2) did not meet the specified acceptance criteria and are documented in Appendix F. TBE has addressed each issue through the TBE Corrective Action Program.

The EIS laboratory analyzed the following nuclides for PBAPS: gross beta, gamma and low-level iodine in water, air particulate (filter), charcoal (cartridge) and milk matrices. For the EIS laboratory, 135 of 135 analyses met the specified acceptance criteria in 2021. All analyses met the specified acceptance criteria.

For the GEL laboratory, the only nuclide analyzed was tritium in water and 8 of 8 analyses met the specified acceptance criteria.

The Inter-Laboratory Comparison Program provides evidence of "in control" counting systems and methods, and that the laboratories are producing accurate and reliable data.

VI. References

1. Preoperational Environs Radioactivity Survey Summary Report, March 1960 through January 1966. (September 1967)

2. Interex Corporation, Peach Bottom Atomic Power Station Regional Environs Radiation Monitoring Program Preoperational Summary Report, Units 2 and 3, 5 February 1966 through 8 August 1973, June 1977, Natick, Massachusetts

3. Radiation Management Corporation Publication, Peach Bottom Atomic Power Station Preoperational Radiological Monitoring Report for Unit 2 and 3, January 1974, Philadelphia, Pennsylvania

4. Information from NCRP Reports 160 and 94

5. Primarily from airborne radon and its radioactive progeny

6. Includes CT (147 mrem), nuclear medicine (77 mrem), interventional fluoroscopy (43 mrem) and conventional radiography and fluoroscopy (33 mrem)

7. Primarily from cigarette smoking (4.6 mrem), commercial air travel (3.4 mrem), building materials (3.5 mrem), and mining and agriculture (0.8 mrem)

8. Industrial, security, medical, educational, and research

9. Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors, Generic Letter 89-01, Supplement No. 1 (NUREG-1302), April 1991

10. American National Standards Institute/Health Physics Society, (ANSI/HPS) N13.37-2014, “Environmental Dosimetry – Criteria for System Design and Implementation”

11. U.S. Nuclear Regulatory Commission, Regulatory Guide 4.13, Revision 2, “Environmental Dosimetry - Performance, Specifications, Testing, and Data Analysis”, June 2020

12. Code of Federal Regulations 40 CFR 190, “Environmental Radiation Protection Standards for Nuclear Power Operations”, 1977

APPENDIX A

RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT SUMMARY

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TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION — **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK COUNTY , PA — **REPORTING PERIOD:** 2021

MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	INDICATOR LOCATIONS MEAN (M) (F) *RANGE*	CONTROL LOCATION MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M): MEAN (M) (F) *RANGE*	LOCATION WITH HIGHEST ANNUAL MEAN (M): STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
SURFACE WATER *(PCI/LITER)*	**H-3**	8	200	<LLD	<LLD	-		0
	I-131	24	1	<LLD	<LLD	-		0
	GAMMA	24						
	Mn-54		15	<LLD	<LLD	-		0
	Co-58		15	<LLD	<LLD	-		0
	Fe-59		30	<LLD	<LLD	-		0
	Co-60		15	<LLD	<LLD	-		0
	Zn-65		30	<LLD	<LLD	-		0
	Nb-95		15	<LLD	<LLD	-		0
	Zr-95		30	<LLD	<LLD	-		0
	Cs-134		15	<LLD	<LLD	-		0
	Cs-137		18	<LLD	<LLD	-		0
	Ba-140		60	<LLD	<LLD	-		0
	La-140		15	<LLD	<LLD	-		0
DRINKING WATER *(PCI/LITER)*	**GR-B**	36	4	2.5 (11/24) *1.8 - 3.7*	2.3 (5/12) *1.8 - 3.3*	2.6 (6/12) *1.8 - 3.7*	13B INDICATOR CHESTER WATER AUTH. SUSQUEHANNA PUMPING STA. 13306 FEET ESE	0
	H-3	12	200	202 (1/8)	<LLD	202 (1/4)	4L INDICATOR CONOWINGO DAM EL 33' MSL 45900 FEET SE	0
	I-131 (LOW LVL)	36	1	<LLD	<LLD	-		0
	GAMMA	36						
	MN-54		15	<LLD	<LLD	-		0
	CO-58		15	<LLD	<LLD	-		0
	FE-59		30	<LLD	<LLD	-		0
	CO-60		15	<LLD	<LLD	-		0
	ZN-65		30	<LLD	<LLD	-		0
	NB-95		15	<LLD	<LLD	-		0
	ZR-95		30	<LLD	<LLD	-		0
	CS-134		15	<LLD	<LLD	-		0
	CS-137		18	<LLD	<LLD	-		0
	BA-140		60	<LLD	<LLD	-		0
	LA-140		15	<LLD	<LLD	-		0

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK COUNTY , PA **REPORTING PERIOD:** 2021

MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
BOTTOM FEEDER	**GAMMA**	4						
(PCI/KG WET)	*K-40*		NA	2870 (2/2) *2166 - 3574*	3008 (2/2) *2911 - 3104*	3008 (2/2) *2911 - 3104*	6 CONTROL HOLTWOOD POND 50000 - 70000 FEET NW	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
PREDATOR	**GAMMA**	4						
(PCI/KG WET)	*K-40*		NA	3582 (2/2) *2914 - 4250*	2905 (2/2) *2773 - 3036*	3582 (2/2) *2914 - 4250*	4 INDICATOR CONOWINGO POND 600-10000 FEET SE	0
	MN-54		130	<LLD	<LLD	-		0
	CO-58		130	<LLD	<LLD	-		0
	FE-59		260	<LLD	<LLD	-		0
	CO-60		130	<LLD	<LLD	-		0
	ZN-65		260	<LLD	<LLD	-		0
	CS-134		130	<LLD	<LLD	-		0
	CS-137		150	<LLD	<LLD	-		0
SEDIMENT	**GAMMA**	6						
(PCI/KG DRY)	*K-40*		NA	16080 (4/4) *11310 - 23170*	13290 (2/2) *12970 - 13610*	20480 (2/2) *17790 - 23170*	4T INDICATOR CONOWINGO POND NEAR CONOWINGO DAM 41800 FEET SE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	CS-134		150	<LLD	<LLD	-		0
	CS-137		180	<LLD	<LLD	-		0

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK COUNTY , PA **REPORTING PERIOD:** 2021

MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED		NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
AIR PARTICULATE *(E-3 PCI/CU.METER)*	**GR-B**		263	10	20 (210/210) *7 - 44*	19 (53/53) *7 - 38*	22 (53/53) *10 - 39*	3A INDICATOR DELTA PA SUBSTATION 2500 FEET NW	0
	GAMMA		20						
		BE-7		NA	87 (16/16) *54 - 130*	87 (4/4) *67 - 107*	100 (4/4) *85 - 130*	3A INDICATOR DELTA PA SUBSTATION 19300 FEET SW	0
		MN-54		NA	<LLD	<LLD	-		0
		CO-58		NA	<LLD	<LLD	-		0
		CO-60		NA	<LLD	<LLD	-		0
		CS-134		50	<LLD	<LLD	-		0
		CS-137		60	<LLD	<LLD	-		0
AIR IODINE *(E-3 PCI/CU.METER)*	**GAMMA**		263						
		I-131		70	<LLD	<LLD	-		0
MILK *(PCI/LITER)*	**I-131 (LOW LVL)**		129	1	<LLD	<LLD	-		0
	GAMMA		129						
		K-40		NA	1239 (100/100) *973 - 1871*	1252 (29/29) *1087 - 1435*	1304 (4/4) *1280 - 1337*	Y INDICATOR 10500 FEET NE	0
		CS-134		15	<LLD	<LLD	-		0
		CS-137		18	<LLD	<LLD	-		0
		BA-140		60	<LLD	<LLD	-		0
		LA-140		15	<LLD	<LLD	-		0

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.

TABLE A-1 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL SUMMARY FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

NAME OF FACILITY: PEACH BOTTOM ATOMIC POWER STATION — **DOCKET NUMBER:** 50-277 & 50-278
LOCATION OF FACILITY: YORK COUNTY , PA — **REPORTING PERIOD:** 2021

MEDIUM OR PATHWAY SAMPLED *(UNIT OF MEASUREMENT)*	TYPES OF ANALYSIS PERFORMED	NUMBER OF ANALYSIS PERFORMED	REQUIRED LOWER LIMIT OF DETECTION (LLD)	**INDICATOR LOCATIONS** MEAN (M) (F) *RANGE*	**CONTROL LOCATION** MEAN (M) (F) *RANGE*	**LOCATION WITH HIGHEST ANNUAL MEAN (M)** MEAN (M) (F) *RANGE*	STATION # NAME DISTANCE AND DIRECTION	NUMBER OF NONROUTINE REPORTED MEASUREMENTS
VEGETATION *(PCI/KG WET)*	**GAMMA**	46						
	BE-7		NA	1017 (15/36) *269 - 4611*	1108 (8/10) *373 - 3677*	1631 (5/12) *356 - 4611*	3Q INDICATOR 103 FLINTVILLE RD. 9500 FEET W	0
	K-40		NA	4172 (36/36) *1142 - 7605*	5804 (10/10) *3616 - 9617*	5804 (10/10) *3616 - 9617*	55 CONTROL NE SECTOR 51900 FEET NE	0
	MN-54		NA	<LLD	<LLD	-		0
	CO-58		NA	<LLD	<LLD	-		0
	CO-60		NA	<LLD	<LLD	-		0
	I-131		60	<LLD	<LLD	-		0
	CS-134		60	<LLD	<LLD	-		0
	CS-137		80	<LLD	<LLD	-		0
DIRECT RADIATION *NET NORMALIZED DOSE (MREM)*	**OSLD-QUARTERLY**	192	NA	6.2 (1/192)	NA	6.2 (1/192)	1L PEACH BOTTOM UNIT 3 INTAKE 1 1100 FEET NE	0

(M) The Mean Values are calculated using the positive values. (F) Fraction of detectable measurement are indicated in parentheses.

APPENDIX B

SAMPLE DESIGNATION AND LOCATIONS

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TABLE B-1 Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2021

Location	Location Description	Distance & Direction From Site
A. Surface Water		
1LL	Peach Bottom Units 2 and 3 Intake - Composite (Control)	1,200 feet ENE
1MM	Peach Bottom Canal Discharge -Composite	5,500 feet SE
B. Drinking (Potable) Water		
4L	Conowingo Dam EL 33' MSL - Composite	45,900 feet SE
6I	Holtwood Dam Hydroelectric Station - Composite (Control)	30,500 feet NW
13B	Chester Water Authority (CWA) Susquehanna Pumping Station- Composite	13,300 feet ESE
C. Fish		
4	Conowingo Pond	6,000 – 10,000 feet SE
6	Holtwood Pond (Control)	50,000 – 70,000 feet NNW
D. Sediment		
4J	Conowingo Pond near Berkin's Run	7,400 feet SE
4T	Conowingo Pond near Conowingo Dam	41,800 feet SE
6F	Holtwood Dam (Control)	31,500 feet NW
E. Air Particulate - Air Iodine		
1B	Weather Station #2	2,500 feet NW
1Z	Weather Station #1	1,500 feet SE
1A	Weather Station #1	1,500 feet SE
1C	Peach Bottom South Sub Station	4,700 feet SSE
3A	Delta, PA – Substation	19,300 feet SW
5H2	Manor Substation (Control)	162,400 feet NE
F. Milk - bi-weekly / monthly		
J		5,100 feet W
R		4,900 feet SW
S		19,100 feet SE
V	(Control)	32,600 feet W
X		9,500 feet NW
G. Milk - quarterly		
C	(Control)	50,400 feet NW
D		18,500 feet NE
E	(Control)	46,100 feet N
P		11,000 feet ENE
W		89,200 feet S
Y		10,500 feet NE
H. Food Products		
1C		4,700 feet SSE
2Q		9,200 feet SW
3Q		9,500 feet W
55	(Control)	51,900 feet NE

TABLE B-1 Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2021

Location	Location Description	Distance & Direction From Site
J. Environmental Dosimetry - OSLD		
Site Boundary		
1A	Weather Station #1	1,500 feet SE
1B	Weather Station #2	2,500 feet NW
1C	Peach Bottom South Substation	4,700 feet SSE
1D	140 o Sector	3,500 feet SSE
1E	Peach Bottom 350o Sector Hill	3,000 feet NNW
1F	Peach Bottom 200o Sector Hill	2,900 feet SSW
1G	Peach Bottom North Substation	3,100 feet WNW
1H	Peach Bottom 270o Sector Hill	3,200 feet W
1I	Peach Bottom South Substation	2,900 feet S
1J	Peach Bottom 180o Sector Hill	4,000 feet S
1K	Peach Bottom Site Area	4,700 feet SW
1L	Peach Bottom Unit 3 Intake	1,100 feet NE
1M	Discharge	5,400 feet SE
1NN	Peach Bottom Site	2,700 feet WSW
1P	Tower B & C Fence	2,200 feet ESE
1Q	Tower D & E Fence	3,300 feet SE
1R	Transmission Line Hill/ISFSI Pad	2,800 feet SSE
2	Peach Bottom 130o Sector Hill	4,700 feet SE
2B*	Burk Property	3,900 feet SSE
40	Peach Bottom Site Area	8,000 feet SW
Intermediate Distance		
1T*	Lay Road/LLRWSF	3,100 feet WNW
3A	Delta, PA Substation	19,300 feet SW
4K	Conowingo Dam Power House Roof	45,900 feet SE
5	Wakefield, PA	24,400 feet E
6B	Holtwood Dam Power House Roof	30,400 feet NW
14	Peters Creek	10,300 feet E
15	Silver Spring Rd	19,300 feet N
17	Riverview Rd	21,500 feet ESE
22	Eagle Road	12,500 feet NNE
23	Peach Bottom 150° Sector Hill	5,500 feet SSE
26	Slab Road	21,800 feet NW
27	N. Cooper Road	14,400 feet S
31A	Eckman Rd	24,100 feet SE
32	Slate Hill Rd	14,400 feet ENE
42	Muddy Run Environ. Laboratory	21,600 feet NNW
43	Drumore Township School	26,200 feet NNE
44	Goshen Mill Rd	26,700 feet NE
45	PB-Keeney Line	18,500 feet ENE
46	Broad Creek	23,800 feet SSE
47	Broad Creek Scout Camp	22,700 feet S
48	Macton Substation	26,500 feet SSW
49	PB-Conastone Line	21,500 feet WSW
50	TRANSCO Pumping Station	26,400 feet W
51	Fin Substation	21,000 feet WNW
Control		
16	Nottingham, PA Substation (Control)	67,100 feet E
18	Fawn Grove, PA (Control)	52,200 feet W
19	Red Lion, PA (Control)	124,000 feet WNW
24	Harrisville, MD Substation (Control)	58,200 feet ESE

**Nearest Residents*

TABLE B-2 Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Peach Bottom Atomic Power Station, 2021

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Surface Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis ST-C-095-835-2 Circulating Water Intake and Discharge Composite Sampling	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Surface Water	Tritium	Quarterly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis ST-C-095-835-2 Circulating Water Intake and Discharge Composite Sampling	500 ml	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation GEL, EPA906.0 Mod, for Tritium analysis by Liquid Scintillation
Surface Water	I-131	Monthly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis ST-C-095-835-2 Circulating Water Intake and Discharge Composite Sampling	2 gallon	TBE, TBE-2012 Radioiodine in Various Matrices EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Drinking Water	Gross Beta	Monthly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis	2 gallon	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices CY-ES-206, Operation of the Tennelec S5E Proportional Counter
Drinking Water	I-131	Monthly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis	2 gallon	TBE, TBE-2012 Radioiodine in Various Matrices EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Drinking Water	Gamma Spectroscopy	Monthly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Drinking Water	Tritium	Quarterly composite from a continuous water compositor	CY-ES-240 Surface, Drinking, and Effluent Water Sample Collection for Radiological Analysis	500 ml	TBE, TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation GEL, EPA906.0 Mod, for Tritium Analysis by Liquid Scintillation
Fish	Gamma Spectroscopy	Semi-annual samples collected via electroshocking or other techniques	NAI-ER3 Collection of fish samples for radiological analysis (PBAPS)	1000 grams (wet)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System

TABLE B-2 Radiological Environmental Monitoring Program – Summary of Sample Collection and Analytical Methods, Peach Bottom Atomic Power Station, 2021

Sample Medium	Analysis	Sampling Method	Collection Procedure Number	Sample Size	Analytical Procedure Number
Sediment	Gamma Spectroscopy	Semi-annual grab samples	NAI-ER3 Collection of sediment samples for radiological analysis (PBAPS)	500 grams (dry)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205, Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Air Particulates	Gross Beta	One-week composite of continuous air sampling through glass fiber filter paper	CY-ES-237 Air Iodine and Air Particulate Sample Collection for Radiological Analysis	1 filter (~ 280 cubic meters weekly)	TBE, TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices EIS, CY-ES-206, Operation of the Tennelec S5E Proportional Counter
Air Particulates	Gamma Spectroscopy	Quarterly composite of each station	TBE, TBE-2023 Compositing of samples CY-ES-204 Sample Preparation for Gamma and Beta Counting	13 filters (~ 3600 cubic meters)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Air Iodine	Gamma Spectroscopy	One-week composite of continuous air sampling through charcoal filter	CY-ES-237 Air Iodine and Air Particulate Sample Collection for Radiological Analysis	1 filter (~ 280 cubic meters weekly)	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Milk	I-131	Bi-weekly grab sample when cows are on pasture. Monthly all other times	CY-ES-238 Milk Sample Collection for Radiological Analysis	2 gallon	TBE, TBE-2012 Radioiodine in Various Matrices EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Milk	Gamma Spectroscopy	Bi-weekly grab sample when cows are on pasture; Monthly all other times	CY-ES-238 Milk Sample Collection for Radiological Analysis	2 gallon	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
Food Products	Gamma Spectroscopy	Monthly when available	CY-ES-241 Vegetation Sample Collection for Radiological Analysis	1000 grams	TBE, TBE-2007 Gamma-Emitting Radioisotope Analysis EIS, CY-ES-205 Gamma Counting Using the HPGe Detector with the Genie PC Counting System
OSLD	Optically Stimulated Luminescence Dosimetry	Quarterly OSLDs comprised of two Al_2O_3:C Landauer Incorporated elements.	CY-ES-239, Collection/Exchange of Field Dosimeters for Radiological Analysis	2 dosimeters	Landauer Incorporated

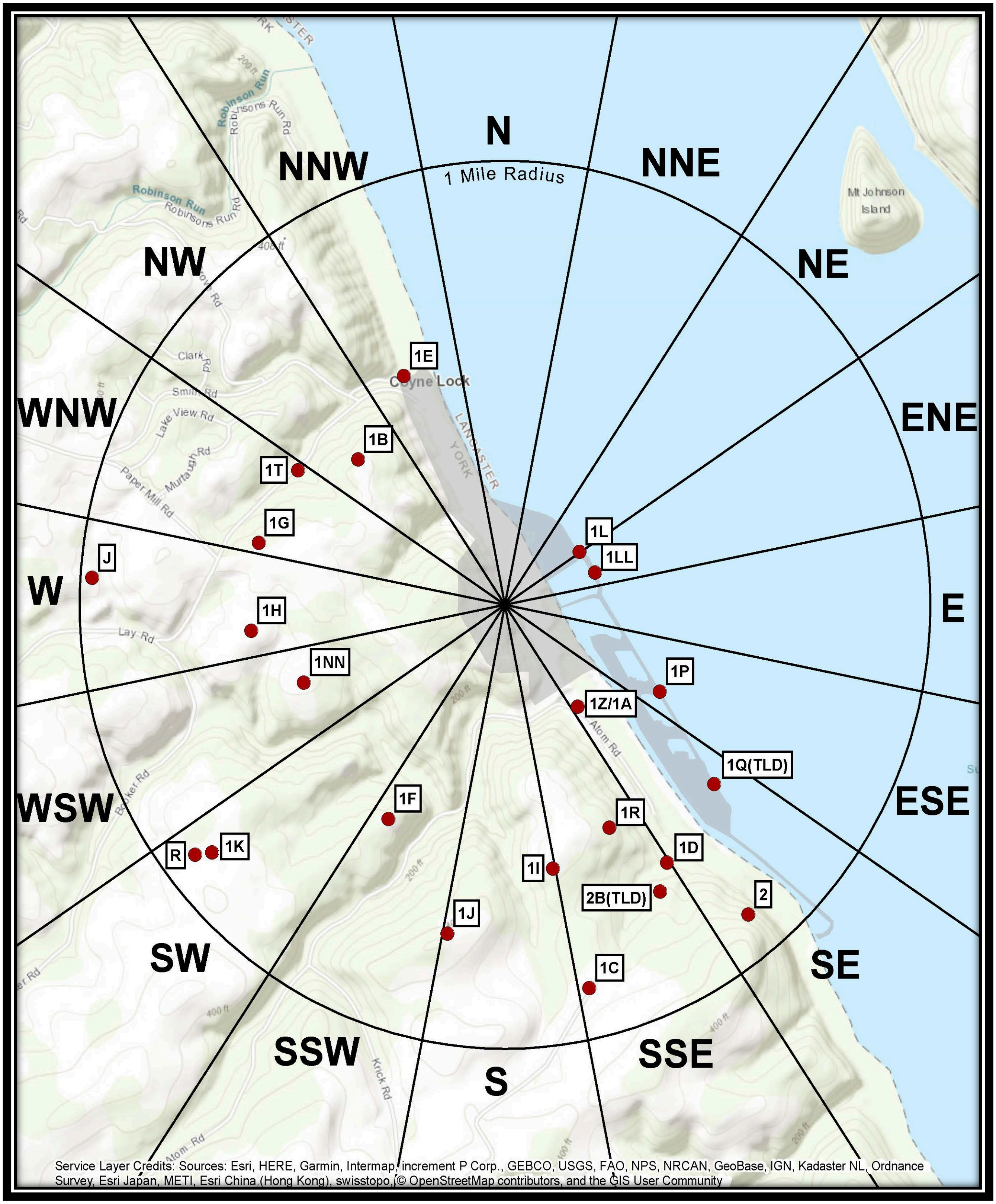

Figure B-1
Environmental Sampling Locations Within One Mile
of Peach Bottom Atomic Power Station, 2021

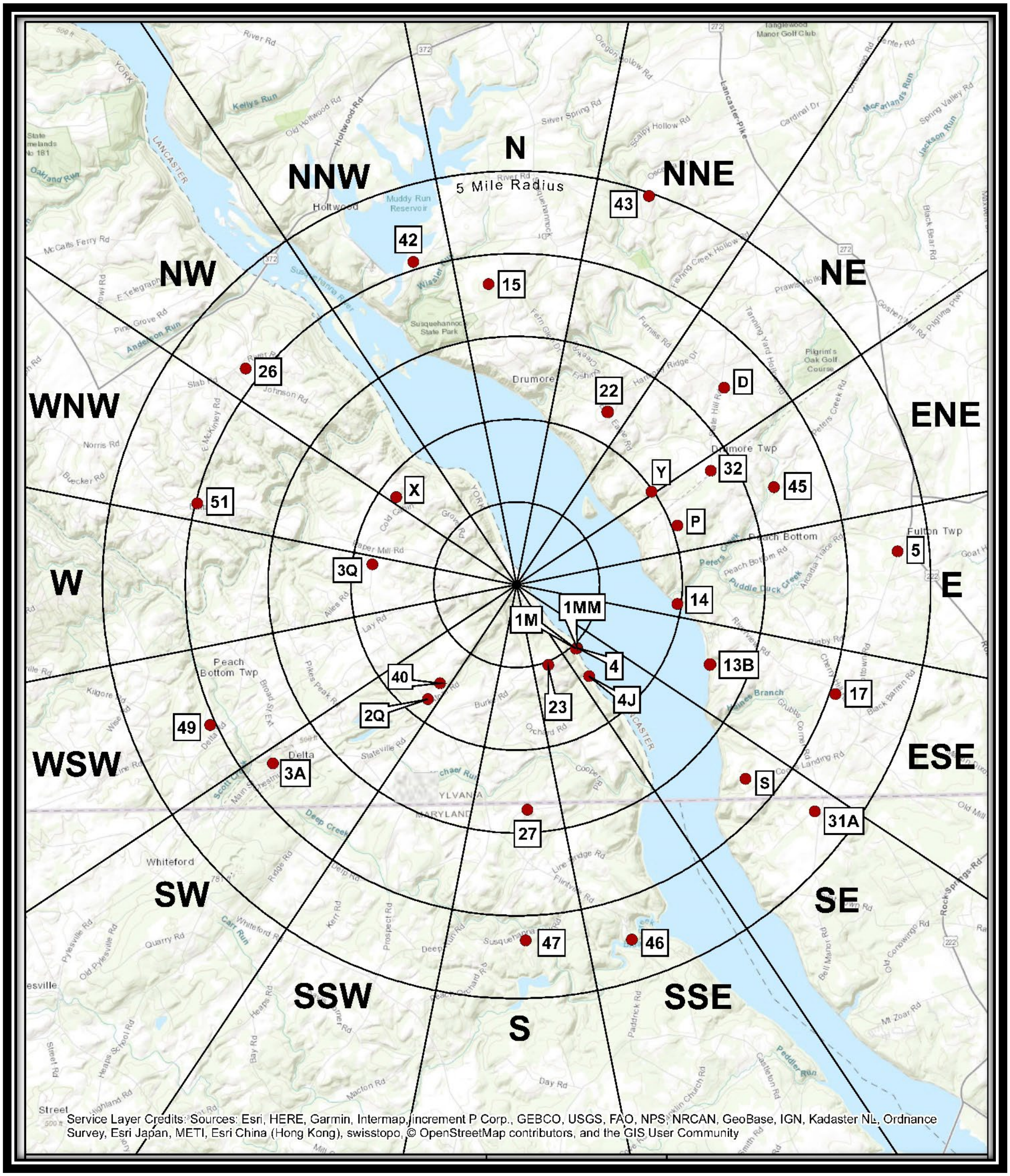

Figure B-2
Environmental Sampling Locations Between One and Approximately
Five Miles of Peach Bottom Atomic Power Station, 2021

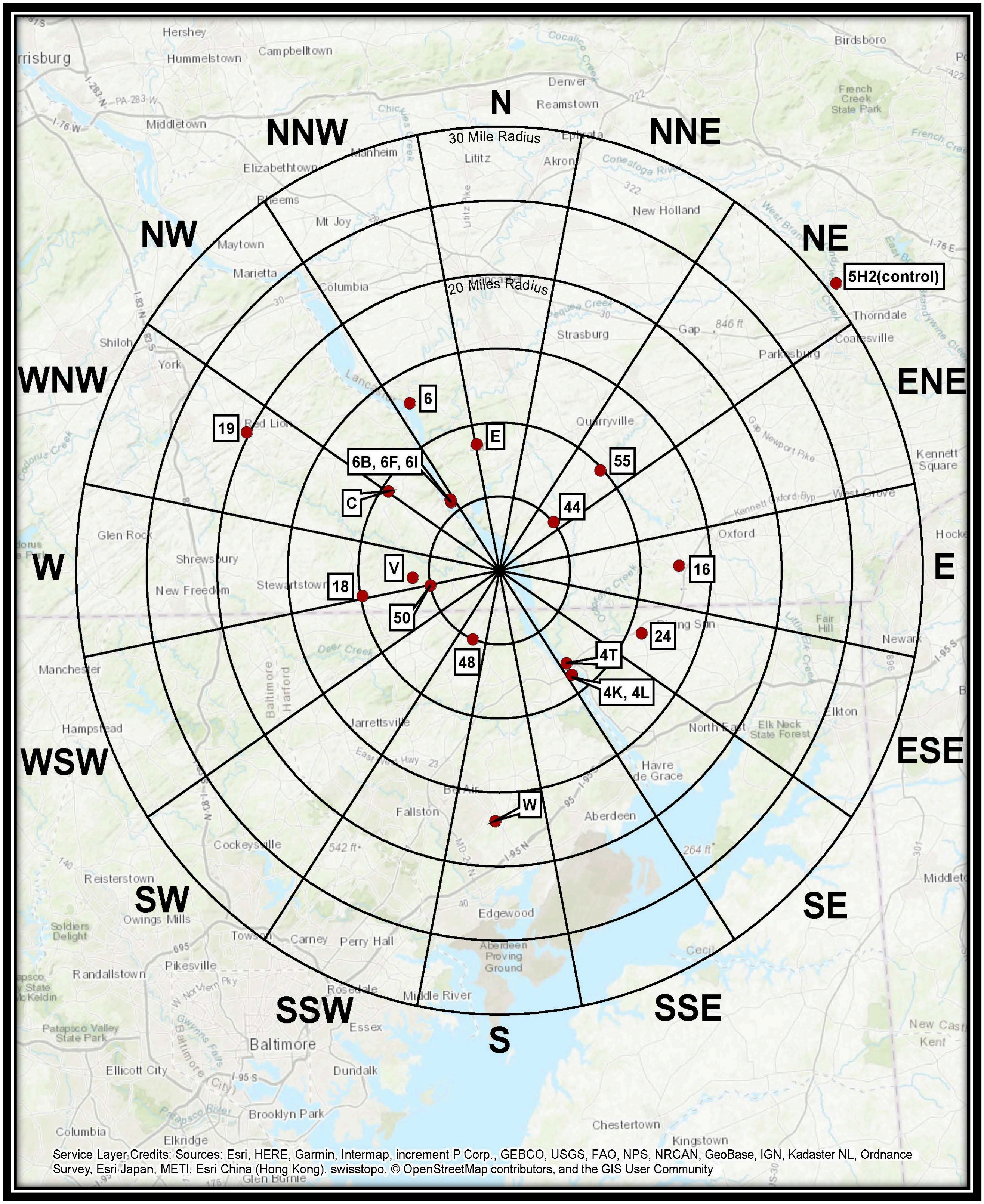

Figure B-3
Environmental Sampling Locations Greater Than
Five Miles from Peach Bottom Atomic Power Station, 2021

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Table C-I.1 CONCENTRATIONS OF TRITIUM IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER + 2 SIGMA

COLLECTION PERIOD	1LL	1MM
12/29/20 - 03/31/21	< 183	< 183
03/31/21 - 06/30/21	< 183	< 189
06/30/21 - 09/29/21	< 185	< 181
09/29/21 - 01/05/22	< 184	< 186
MEAN	-	-

Table C-I.2 CONCENTRATIONS OF LOW LEVEL I-131 IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER + 2 SIGMA

COLLECTION PERIOD	1LL	1MM
12/29/20 - 01/27/21	< 0.6	< 0.8
01/27/21 - 03/03/21	< 0.9	< 0.9
03/03/21 - 03/31/21	< 0.9	< 0.9
03/31/21 - 04/28/21	< 0.9	< 0.8
04/28/21 - 06/02/21	< 1.0	< 0.9
06/02/21 - 06/30/21	< 0.9	< 0.8
06/30/21 - 07/28/21	< 0.8	< 0.8
07/28/21 - 09/01/21	< 0.9	< 0.7
09/01/21 - 09/29/21	< 0.9	< 0.8
09/29/21 - 11/03/21	< 0.9	< 0.8
11/03/21 - 12/01/21	< 0.8	< 0.8
12/01/21 - 01/05/22	< 0.9	< 0.8
MEAN	-	-

Table C-I.3 **CONCENTRATIONS OF GAMMA EMITTERS IN SURFACE WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
1LL	12/29/20 - 01/27/21	< 6	< 7	< 14	< 5	< 14	< 6	< 8	< 7	< 7	< 31	< 10
	01/27/21 - 03/03/21	< 7	< 7	< 16	< 8	< 15	< 5	< 14	< 9	< 8	< 30	< 8
	03/03/21 - 03/31/21	< 6	< 7	< 12	< 6	< 13	< 6	< 11	< 8	< 5	< 28	< 12
	03/31/21 - 04/28/21	< 2	< 2	< 4	< 2	< 4	< 2	< 4	< 2	< 2	< 14	< 4
	04/28/21 - 06/02/21	< 5	< 6	< 16	< 6	< 11	< 6	< 14	< 7	< 7	< 30	< 10
	06/02/21 - 06/30/21	< 3	< 5	< 8	< 5	< 8	< 5	< 8	< 4	< 5	< 25	< 10
	06/30/21 - 07/28/21	< 7	< 7	< 13	< 11	< 17	< 9	< 14	< 9	< 8	< 28	< 10
	07/28/21 - 09/01/21	< 5	< 6	< 14	< 5	< 9	< 6	< 11	< 7	< 5	< 26	< 11
	09/01/21 - 09/29/21	< 7	< 5	< 13	< 4	< 11	< 8	< 12	< 7	< 5	< 29	< 10
	09/29/21 - 11/03/21	< 6	< 6	< 16	< 8	< 10	< 6	< 14	< 5	< 6	< 26	< 10
	11/03/21 - 12/01/21	< 5	< 8	< 11	< 6	< 15	< 8	< 10	< 9	< 8	< 26	< 12
	12/01/21 - 01/05/22	< 6	< 6	< 16	< 9	< 14	< 7	< 11	< 8	< 8	< 33	< 14
	MEAN	-	-	-	-	-	-	-	-	-	-	-
1MM	12/29/20 - 01/27/21	< 5	< 6	< 11	< 6	< 12	< 5	< 9	< 6	< 6	< 22	< 10
	01/27/21 - 03/03/21	< 6	< 4	< 17	< 7	< 13	< 9	< 15	< 8	< 7	< 33	< 13
	03/03/21 - 03/31/21	< 7	< 7	< 15	< 9	< 12	< 6	< 11	< 6	< 6	< 24	< 12
	03/31/21 - 04/28/21	< 2	< 2	< 5	< 2	< 4	< 2	< 4	< 2	< 2	< 15	< 5
	04/28/21 - 06/02/21	< 6	< 4	< 11	< 5	< 10	< 7	< 10	< 4	< 7	< 32	< 10
	06/02/21 - 06/30/21	< 6	< 6	< 13	< 7	< 12	< 6	< 9	< 8	< 6	< 27	< 11
	06/30/21 - 07/28/21	< 7	< 6	< 16	< 8	< 17	< 6	< 14	< 6	< 8	< 37	< 14
	07/28/21 - 09/01/21	< 8	< 6	< 13	< 6	< 12	< 8	< 11	< 8	< 7	< 31	< 9
	09/01/21 - 09/29/21	< 7	< 7	< 14	< 7	< 9	< 6	< 11	< 6	< 7	< 33	< 14
	09/29/21 - 11/03/21	< 6	< 7	< 9	< 8	< 15	< 9	< 12	< 7	< 7	< 38	< 10
	11/03/21 - 12/01/21	< 6	< 5	< 17	< 6	< 14	< 7	< 10	< 7	< 8	< 34	< 12
	12/01/21 - 01/05/22	< 7	< 6	< 14	< 7	< 17	< 7	< 12	< 6	< 7	< 27	< 9
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-II.1 CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
12/29/20 - 01/28/21	1.8 ± 1.3	< 1.8	< 1.8
01/28/21 - 03/02/21	2.7 ± 1.1	2.1 ± 1.1	1.8 ± 1.1
03/01/21 - 03/30/21	< 1.9	< 1.8	< 1.8
03/29/21 - 04/27/21	< 2.1	< 1.9	< 1.9
04/27/21 - 06/02/21	< 1.8	< 1.8	2.2 ± 1.3
06/02/21 - 06/29/21	< 2.3	< 2.3	< 2.3
06/28/21 - 07/26/21	< 2.2	2.3 ± 1.6	< 2.2
07/27/21 - 08/31/21	2.6 ± 1.4	2.4 ± 1.4	2.0 ± 1.4
08/31/21 - 09/28/21	2.1 ± 1.3	2.8 ± 1.2	< 1.7
09/28/21 - 11/02/21	3.7 ± 1.5	2.0 ± 1.3	2.1 ± 1.3
11/01/21 - 11/30/21	2.7 ± 1.4	< 2.0	3.3 ± 1.9
11/29/21 - 01/04/22	< 2.0	< 2.0	< 2.0
MEAN ± 2 STD DEV	2.6 ± 1.3	2.3 ± 0.6	2.3 ± 1.1

Table C-II.2 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
12/29/20 - 03/30/21	< 184	< 187	< 187
03/30/21 - 06/29/21	< 181	< 184	< 187
06/29/21 - 09/28/21	< 181	< 178	< 184
09/28/21 - 01/04/22	< 174	202 ± 126	< 180
MEAN	-	202 ± 0	-

Table C-II.3 CONCENTRATIONS OF LOW LEVEL I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	13B	4L	6I
12/29/20 - 01/28/21	< 0.9	< 0.8	< 0.7
01/28/21 - 03/02/21	< 0.9	< 0.8	< 0.8
03/01/21 - 03/30/21	< 0.9	< 0.9	< 0.9
03/29/21 - 04/27/21	< 0.9	< 0.9	< 0.8
04/27/21 - 06/02/21	< 0.9	< 0.9	< 1.0
06/02/21 - 06/29/21	< 0.8	< 0.9	< 0.9
06/28/21 - 07/27/21	< 0.9	< 0.9	< 0.9
07/27/21 - 08/31/21	< 0.8	< 0.9	< 0.6
08/31/21 - 09/28/21	< 0.9	< 0.9	< 0.9
09/28/21 - 11/02/21	< 0.7	< 0.7	< 0.8
11/01/21 - 11/30/21	< 0.7	< 0.8	< 1.0
11/29/21 - 01/04/22	< 0.7	< 0.8	< 0.7
MEAN	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-II.4

CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER + 2 SIGMA

SITE	COLLECTION PERIOD	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
13B	12/28/20 - 01/25/21	< 5	< 5	< 12	< 6	< 11	< 4	< 10	< 6	< 4	< 21	< 12
	01/25/21 - 03/01/21	< 5	< 4	< 12	< 4	< 9	< 5	< 7	< 5	< 5	< 24	< 8
	03/01/21 - 03/29/21	< 5	< 6	< 14	< 6	< 10	< 7	< 10	< 7	< 5	< 28	< 9
	03/29/21 - 04/26/21	< 3	< 3	< 6	< 3	< 6	< 3	< 5	< 3	< 2	< 19	< 5
	04/26/21 - 06/02/21	< 8	< 6	< 18	< 6	< 9	< 8	< 14	< 9	< 8	< 43	< 11
	06/02/21 - 06/28/21	< 5	< 7	< 11	< 7	< 12	< 7	< 8	< 7	< 7	< 33	< 7
	06/28/21 - 07/26/21	< 6	< 6	< 14	< 5	< 13	< 6	< 11	< 8	< 6	< 33	< 13
	07/26/21 - 08/30/21	< 5	< 5	< 10	< 6	< 11	< 6	< 10	< 6	< 5	< 32	< 11
	08/30/21 - 09/27/21	< 5	< 6	< 10	< 5	< 11	< 4	< 8	< 5	< 5	< 27	< 7
	09/27/21 - 11/01/21	< 6	< 6	< 13	< 6	< 10	< 8	< 11	< 7	< 7	< 32	< 11
	11/01/21 - 11/29/21	< 5	< 6	< 15	< 8	< 10	< 6	< 9	< 6	< 6	< 29	< 14
	11/29/21 - 01/04/22	< 7	< 5	< 11	< 8	< 8	< 6	< 10	< 7	< 7	< 28	< 10
	MEAN	-	-	-	-	-	-	-	-	-	-	-
4L	12/29/20 - 01/28/21	< 6	< 5	< 11	< 6	< 11	< 7	< 10	< 6	< 7	< 24	< 10
	01/28/21 - 03/02/21	< 4	< 5	< 8	< 7	< 13	< 5	< 12	< 7	< 5	< 26	< 10
	03/02/21 - 03/30/21	< 8	< 7	< 17	< 8	< 14	< 7	< 10	< 9	< 8	< 32	< 11
	03/30/21 - 04/27/21	< 3	< 3	< 7	< 3	< 6	< 3	< 6	< 3	< 3	< 19	< 6
	04/27/21 - 06/02/21	< 7	< 7	< 12	< 6	< 14	< 8	< 11	< 6	< 6	< 26	< 14
	06/02/21 - 06/29/21	< 4	< 6	< 17	< 5	< 13	< 7	< 12	< 6	< 7	< 31	< 12
	06/29/21 - 07/27/21	< 6	< 7	< 11	< 6	< 12	< 8	< 11	< 7	< 7	< 31	< 14
	07/27/21 - 08/31/21	< 5	< 6	< 12	< 8	< 13	< 6	< 10	< 5	< 7	< 25	< 9
	08/31/21 - 09/28/21	< 6	< 7	< 12	< 8	< 7	< 8	< 9	< 7	< 5	< 34	< 13
	09/28/21 - 11/03/21	< 6	< 7	< 15	< 7	< 15	< 8	< 12	< 8	< 6	< 41	< 12
	11/03/21 - 11/30/21	< 7	< 7	< 15	< 6	< 16	< 6	< 12	< 8	< 8	< 32	< 11
	11/30/21 - 01/04/22	< 6	< 6	< 11	< 6	< 11	< 6	< 11	< 5	< 7	< 33	< 6
	MEAN	-	-	-	-	-	-	-	-	-	-	-
6I	12/29/20 - 01/28/21	< 6	< 6	< 15	< 4	< 11	< 7	< 11	< 8	< 8	< 28	< 15
	01/28/21 - 03/02/21	< 7	< 6	< 11	< 7	< 10	< 6	< 11	< 5	< 6	< 28	< 8
	03/02/21 - 03/30/21	< 6	< 5	< 13	< 5	< 9	< 6	< 11	< 7	< 7	< 33	< 11
	03/30/21 - 04/27/21	< 3	< 4	< 7	< 4	< 6	< 3	< 6	< 4	< 3	< 23	< 7
	04/27/21 - 06/02/21	< 8	< 7	< 16	< 8	< 16	< 8	< 13	< 8	< 9	< 35	< 11
	06/02/21 - 06/29/21	< 6	< 6	< 13	< 8	< 11	< 6	< 11	< 6	< 6	< 27	< 11
	06/29/21 - 07/27/21	< 6	< 7	< 14	< 3	< 10	< 7	< 12	< 7	< 7	< 40	< 11
	07/27/21 - 08/31/21	< 6	< 5	< 13	< 7	< 13	< 6	< 9	< 6	< 5	< 27	< 10
	08/31/21 - 09/28/21	< 7	< 6	< 13	< 7	< 11	< 6	< 11	< 6	< 5	< 31	< 8
	09/28/21 - 11/02/21	< 5	< 5	< 9	< 4	< 9	< 5	< 6	< 5	< 4	< 25	< 9
	11/02/21 - 11/30/21	< 6	< 8	< 19	< 9	< 12	< 7	< 13	< 6	< 7	< 42	< 11
	11/30/21 - 01/04/22	< 6	< 5	< 15	< 5	< 12	< 6	< 9	< 7	< 4	< 29	< 11
	MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-III.1 **CONCENTRATIONS OF GAMMA EMITTERS IN PREDATOR AND BOTTOM FEEDER (FISH) SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021**

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
4	06/07/21	4250 ± 1042	< 55	< 57	< 126	< 63	< 161	< 69	< 62
PREDATOR	10/13/21	2914 ± 1005	< 61	< 50	< 135	< 65	< 135	< 81	< 57
	MEAN ± 2 STD DEV	3582 ± 1889	-	-	-	-	-	-	-
4	06/07/21	3574 ± 958	< 68	< 59	< 123	< 54	< 125	< 68	< 56
BOTTOM FEEDER	10/13/21	2166 ± 794	< 39	< 47	< 94	< 68	< 119	< 61	< 57
	MEAN ± 2 STD DEV	2870 ± 1991	-	-	-	-	-	-	-
6	06/10/21	3036 ± 1145	< 77	< 55	< 143	< 88	< 159	< 85	< 64
PREDATOR	10/19/21	2773 ± 1022	< 66	< 76	< 143	< 78	< 144	< 85	< 76
	MEAN ± 2 STD DEV	2905 ± 372	-	-	-	-	-	-	-
6	06/10/21	2911 ± 995	< 75	< 68	< 175	< 81	< 144	< 72	< 79
BOTTOM FEEDER	10/19/21	3104 ± 1007	< 59	< 58	< 142	< 68	< 112	< 59	< 62
	MEAN ± 2 STD DEV	3008 ± 273	-	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-IV.1 CONCENTRATIONS OF GAMMA EMITTERS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/KG DRY ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Mn-54	Co-58	Co-60	Cs-134	Cs-137
4J	06/22/21	12050 ± 1389	< 58	< 51	< 65	< 58	< 55
	12/10/21	11310 ± 1404	< 66	< 65	< 49	< 77	< 59
	MEAN ± 2 STD DEV	11680 ± 1047	-	-	-	-	-
4T	06/22/21	17790 ± 1914	< 86	< 68	< 89	< 114	< 107
	12/10/21	23170 ± 1675	< 72	< 59	< 81	< 87	< 90
	MEAN ± 2 STD DEV	20480 ± 7608	-	-	-	-	-
6F	06/22/21	13610 ± 1982	< 107	< 98	< 110	< 118	< 129
	12/10/21	12970 ± 1384	< 64	< 66	< 71	< 88	< 85
	MEAN ± 2 STD DEV	13290 ± 905	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021**

RESULTS IN UNITS OF E-3 PCI/CUBIC METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II	GROUP III
PERIOD	1B	1C	1Z	3A	5H2
12/28/20 - 01/04/21					15 ± 4
12/29/20 - 01/06/21	17 ± 4	15 ± 4	14 ± 3	15 ± 4	
01/04/21 - 01/11/21					15 ± 4
01/06/21 - 01/14/21	20 ± 4	22 ± 4	23 ± 4	21 ± 4	
01/11/21 - 01/19/21					28 ± 5
01/14/21 - 01/20/21	24 ± 5	26 ± 5	26 ± 5	30 ± 5	
01/19/21 - 01/25/21					12 ± 4
01/20/21 - 01/28/21	10 ± 3	9 ± 3	13 ± 3	12 ± 3	
01/25/21 - 02/03/21					10 ± 3
01/28/21 - 02/04/21	8 ± 3	7 ± 3	9 ± 4	10 ± 4	
02/03/21 - 02/08/21					17 ± 6
02/04/21 - 02/11/21	21 ± 5	24 ± 5	24 ± 5	26 ± 5	
02/08/21 - 02/15/21					21 ± 4
02/11/21 - 02/17/21	12 ± 4	13 ± 4	17 ± 4	19 ± 4	
02/15/21 - 02/22/21					23 ± 4
02/17/21 - 02/24/21	21 ± 4	25 ± 5	22 ± 4	27 ± 5	
02/22/21 - 03/02/21					17 ± 4
02/24/21 - 03/02/21	12 ± 4	12 ± 5	14 ± 5	15 ± 5	
03/02/21 - 03/08/21	17 ± 4	17 ± 4	18 ± 4	19 ± 4	14 ± 4
03/08/21 - 03/15/21					17 ± 4
03/09/21 - 03/16/21	22 ± 4	21 ± 4	22 ± 4	24 ± 5	
03/15/21 - 03/22/21					20 ± 4
03/16/21 - 03/24/21	18 ± 4	16 ± 4	23 ± 4	23 ± 4	
03/22/21 - 03/30/21					11 ± 4
03/24/21 - 03/30/21	10 ± 5	11 ± 5	13 ± 5	11 ± 5	
03/30/21 - 04/05/21	23 ± 5	21 ± 5	21 ± 5	22 ± 5	20 ± 5
04/05/21 - 04/12/21					13 ± 4
04/06/21 - 04/13/21	12 ± 4	10 ± 4	13 ± 4	12 ± 4	
04/12/21 - 04/19/21					7 ± 3
04/13/21 - 04/21/21	12 ± 3	14 ± 4	15 ± 4	16 ± 4	
04/19/21 - 04/26/21					18 ± 4
04/21/21 - 04/27/21	24 ± 5	26 ± 5	29 ± 5	26 ± 5	
04/26/21 - 05/03/21					19 ± 4
04/27/21 - 05/04/21	21 ± 5	19 ± 5	17 ± 5	28 ± 5	
05/03/21 - 05/10/21					7 ± 4
05/04/21 - 05/11/21	13 ± 4	8 ± 3	13 ± 4	11 ± 4	
05/10/21 - 05/17/21					15 ± 4
05/11/21 - 05/18/21	21 ± 5	17 ± 4	23 ± 5	21 ± 5	
05/17/21 - 05/24/21					21 ± 5
05/18/21 - 05/26/21	23 ± 4	17 ± 4	25 ± 5	28 ± 5	
05/24/21 - 06/01/21					11 ± 4
05/26/21 - 06/02/21	9 ± 4	11 ± 4	13 ± 4	15 ± 4	
06/01/21 - 06/07/21					22 ± 5
06/02/21 - 06/08/21	16 ± 5	15 ± 5	22 ± 5	24 ± 5	
06/07/21 - 06/14/21					12 ± 4
06/08/21 - 06/15/21	11 ± 4	16 ± 4	15 ± 4	14 ± 4	
06/14/21 - 06/21/21					12 ± 4
06/15/21 - 06/22/21	19 ± 5	17 ± 5	21 ± 5	20 ± 5	
06/21/21 - 06/28/21					9 ± 4
06/22/21 - 06/29/21	13 ± 4	14 ± 4	12 ± 3	14 ± 4	
06/28/21 - 07/06/21					10 ± 3
06/29/21 - 07/07/21	13 ± 4	15 ± 4	21 ± 4	17 ± 4	
07/06/21 - 07/12/21					25 ± 5
07/07/21 - 07/13/21	15 ± 4	17 ± 5	24 ± 5	24 ± 5	

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-V.1 **CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021**

RESULTS IN UNITS OF E-3 PCI/CUBIC METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II	GROUP III
PERIOD	1B	1C	1Z	3A	5H2
07/12/21 - 07/19/21					19 ± 4
07/13/21 - 07/20/21	22 ± 5	21 ± 5	26 ± 5	29 ± 5	
07/19/21 - 07/26/21					22 ± 5
07/20/21 - 07/27/21	21 ± 5	18 ± 4	24 ± 5	30 ± 5	
07/26/21 - 08/02/21					18 ± 5
07/27/21 - 08/03/21	21 ± 5	15 ± 4	25 ± 5	28 ± 5	
08/02/21 - 08/09/21					23 ± 4
08/03/21 - 08/10/21	20 ± 4	18 ± 4	29 ± 5	28 ± 5	
08/09/21 - 08/16/21					20 ± 4
08/10/21 - 08/17/21	18 ± 4	17 ± 4	25 ± 5	19 ± 4	
08/16/21 - 08/23/21					12 ± 4
08/17/21 - 08/24/21	13 ± 4	12 ± 4	17 ± 4	16 ± 4	
08/23/21 - 08/30/21					23 ± 5
08/24/21 - 08/31/21	27 ± 5	20 ± 4	26 ± 5	24 ± 4	
08/30/21 - 09/07/21					14 ± 3
08/31/21 - 09/08/21	18 ± 4	17 ± 4	44 ± 20	27 ± 5	
09/07/21 - 09/13/21					24 ± 5
09/08/21 - 09/15/21	28 ± 4	23 ± 4	*(1)*	39 ± 5	
09/13/21 - 09/20/21					38 ± 6
09/15/21 - 09/21/21	18 ± 5	18 ± 5	*(1)*	25 ± 6	
09/20/21 - 09/27/21					14 ± 4
09/21/21 - 09/28/21	17 ± 4	17 ± 4	26 ± 5	22 ± 5	
09/27/21 - 10/04/21					27 ± 5
09/28/21 - 10/05/21	33 ± 5	21 ± 5	26 ± 5	28 ± 5	
10/04/21 - 10/11/21					10 ± 4
10/05/21 - 10/12/21	9 ± 4	7 ± 3	10 ± 4	13 ± 4	
10/11/21 - 10/18/21					20 ± 4
10/12/21 - 10/19/21	18 ± 4	27 ± 5	23 ± 5	25 ± 5	
10/18/21 - 10/25/21					30 ± 5
10/19/21 - 10/26/21	31 ± 5	37 ± 5	27 ± 5	35 ± 5	
10/25/21 - 11/01/21					21 ± 4
10/26/21 - 11/02/21	15 ± 4	18 ± 4	16 ± 8	17 ± 4	
11/01/21 - 11/08/21					14 ± 4
11/02/21 - 11/09/21	25 ± 5	19 ± 5	18 ± 4	20 ± 5	
11/08/21 - 11/15/21					32 ± 5
11/09/21 - 11/16/21	32 ± 5	24 ± 5	22 ± 5	28 ± 5	
11/15/21 - 11/22/21					22 ± 4
11/16/21 - 11/23/21	18 ± 4	22 ± 5	15 ± 4	18 ± 4	
11/22/21 - 11/29/21					18 ± 4
11/23/21 - 11/30/21	21 ± 5	23 ± 5	15 ± 4	24 ± 5	
11/29/21 - 12/06/21					19 ± 5
11/30/21 - 12/07/21	31 ± 5	26 ± 5	20 ± 4	29 ± 5	
12/06/21 - 12/13/21					32 ± 5
12/07/21 - 12/14/21	34 ± 6	30 ± 6	28 ± 6	33 ± 5	
12/13/21 - 12/20/21					23 ± 5
12/14/21 - 12/21/21	22 ± 5	18 ± 4	14 ± 4	24 ± 5	
12/20/21 - 12/28/21					32 ± 5
12/21/21 - 12/29/21	25 ± 5	25 ± 5	18 ± 5	25 ± 4	
12/28/21 - 01/03/22					21 ± 5
12/29/21 - 01/04/22	19 ± 5	21 ± 5	11 ± 4	21 ± 5	
MEAN ± 2 STD DEV	19 ± 13	18 ± 12	20 ± 13	22 ± 13	19 ± 14

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES
(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-V.2 **CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021**

RESULTS IN UNITS OF E-3 PCI/CUBIC METER ± 2 SIGMA

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
1B	12/29/20 - 03/30/21	90 ± 25	< 3	< 3	< 3	< 4	< 3
	03/30/21 - 06/29/21	87 ± 20	< 1	< 1	< 1	< 1	< 1
	06/29/21 - 09/28/21	85 ± 25	< 3	< 3	< 3	< 4	< 3
	09/28/21 - 01/04/22	81 ± 17	< 2	< 2	< 3	< 3	< 3
	MEAN ± 2 STD DEV	78 ± 12	-	-	-	-	-
1C	12/29/20 - 03/30/21	82 ± 17	< 1	< 2	< 2	< 2	< 2
	03/30/21 - 06/29/21	100 ± 19	< 1	< 1	< 1	< 1	< 2
	06/29/21 - 09/28/21	63 ± 18	< 2	< 2	< 4	< 2	< 3
	09/28/21 - 01/04/22	73 ± 26	< 3	< 3	< 2	< 3	< 3
	MEAN ± 2 STD DEV	80 ± 32	-	-	-	-	-
1Z	12/29/20 - 03/30/21	77 ± 20	< 2	< 2	< 2	< 2	< 2
	03/30/21 - 06/29/21	108 ± 18	< 2	< 1	< 2	< 2	< 1
	06/29/21 - 09/28/21	92 ± 25	< 3	< 3	< 2	< 3	< 3
	09/28/21 - 01/04/22	54 ± 16	< 2	< 2	< 2	< 2	< 1
	MEAN ± 2 STD DEV	83 ± 46	-	-	-	-	-
3A	12/29/20 - 03/30/21	94 ± 23	< 3	< 3	< 3	< 4	< 3
	03/30/21 - 06/29/21	130 ± 28	< 3	< 3	< 4	< 3	< 3
	06/29/21 - 09/28/21	91 ± 17	< 2	< 2	< 2	< 2	< 2
	09/28/21 - 01/04/22	85 ± 16	< 2	< 2	< 3	< 2	< 2
	MEAN ± 2 STD DEV	100 ± 40	-	-	-	-	-
5H2	12/28/20 - 03/30/21	107 ± 21	< 2	< 2	< 3	< 2	< 2
	03/30/21 - 06/28/21	67 ± 20	< 1	< 2	< 2	< 2	< 1
	06/28/21 - 09/27/21	88 ± 19	< 2	< 2	< 2	< 2	< 2
	09/27/21 - 01/03/22	86 ± 19	< 2	< 2	< 3	< 3	< 2
	MEAN ± 2 STD DEV	87 ± 33	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VI.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF E-3 PCI/CUBIC METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II	GROUP III
PERIOD	1B	1C	1Z	3A	5H2
12/28/20 - 01/04/21					< 41
12/29/20 - 01/06/21	< 52	< 52	< 52	< 52	
01/04/21 - 01/11/21					< 17
01/06/21 - 01/14/21	< 45	< 45	< 45	< 45	
01/11/21 - 01/19/21					< 10
01/14/21 - 01/20/21	< 33	< 31	< 14	< 31	
01/19/21 - 01/25/21					< 24
01/20/21 - 01/28/21	< 39	< 38	< 38	< 38	
01/25/21 - 02/03/21					< 24
01/28/21 - 02/04/21	< 28	< 28	< 28	< 28	
02/03/21 - 02/08/21					< 15
02/04/21 - 02/11/21	< 35	< 38	< 40	< 39	
02/08/21 - 02/15/21					< 42
02/11/21 - 02/17/21	< 33	< 35	< 35	< 35	
02/15/21 - 02/22/21					< 11
02/17/21 - 02/24/21	< 34	< 16	< 33	< 33	
02/22/21 - 03/02/21					< 28
02/24/21 - 03/02/21	< 26	< 29	< 28	< 13	
03/02/21 - 03/08/21	< 30	< 31	< 30	< 14	< 20
03/08/21 - 03/15/21					< 12
03/09/21 - 03/16/21	< 26	< 27	< 27	< 12	
03/15/21 - 03/22/21					< 31
03/16/21 - 03/24/21	< 17	< 17	< 17	< 17	
03/22/21 - 03/30/21					< 11
03/24/21 - 03/30/21	< 15	< 14	< 14	< 14	
03/30/21 - 04/05/21	< 49	< 48	< 20	< 48	< 17
04/05/21 - 04/12/21					< 14
04/06/21 - 04/13/21	< 12	< 25	< 25	< 25	
04/12/21 - 04/19/21					< 29
04/13/21 - 04/21/21	< 20	< 24	< 24	< 24	
04/19/21 - 04/26/21					< 18
04/21/21 - 04/27/21	< 27	< 26	< 12	< 26	
04/26/21 - 05/03/21					< 15
04/27/21 - 05/04/21	< 20	< 19	< 19	< 20	
05/03/21 - 05/10/21					< 29
05/04/21 - 05/11/21	< 41	< 40	< 40	< 40	
05/10/21 - 05/17/21					< 14
05/11/21 - 05/18/21	< 17	< 28	< 28	< 28	
05/17/21 - 05/24/21					< 38
05/18/21 - 05/26/21	< 22	< 22	< 22	< 22	
05/24/21 - 06/01/21					< 22
05/26/21 - 06/02/21	< 19	< 46	< 46	< 46	
06/01/21 - 06/07/21					< 18
06/02/21 - 06/08/21	< 49	< 48	< 47	< 46	
06/07/21 - 06/14/21					< 22
06/08/21 - 06/15/21	< 38	< 32	< 38	< 38	
06/14/21 - 06/21/21					< 25
06/15/21 - 06/22/21	< 45	< 47	< 47	< 47	
06/21/21 - 06/28/21					< 21
06/22/21 - 06/29/21	< 41	< 39	< 39	< 39	
06/28/21 - 07/06/21					< 13
06/29/21 - 07/07/21	< 41	< 42	< 42	< 42	
07/06/21 - 07/12/21					< 16
MEAN	-	-	-	-	-

Table C-VI.1 CONCENTRATIONS OF I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF E-3 PCI/CUBIC METER ± 2 SIGMA

COLLECTION	GROUP I			GROUP II	GROUP III
PERIOD	1B	1C	1Z	3A	5H2
07/07/21 - 07/13/21	< 38	< 37	< 37	< 37	
07/12/21 - 07/19/21					< 14
07/13/21 - 07/20/21	< 41	< 17	< 40	< 40	
07/19/21 - 07/26/21					< 23
07/20/21 - 07/27/21	< 36	< *36*	< 36	< 36	
07/26/21 - 08/02/21					< 34
07/27/21 - 08/03/21	< 25	< 25	< 25	< 25	
08/02/21 - 08/09/21					< 14
08/03/21 - 08/10/21	< 27	< 27	< 27	< 27	
08/09/21 - 08/16/21					< 32
08/10/21 - 08/17/21	< 19	< 40	< 40	< 40	
08/16/21 - 08/23/21					< 21
08/17/21 - 08/24/21	< 45	< 45	< 45	< 45	
08/23/21 - 08/30/21					< 32
08/24/21 - 08/31/21	< 26	< 62	< 62	< 62	
08/30/21 - 09/07/21					< 11
08/31/21 - 09/08/21	< 34	< 34	< 60	< 34	
09/07/21 - 09/13/21					< 46
09/08/21 - 09/15/21	< 17	< 18	*(1)*	< 18	
09/13/21 - 09/20/21					< 19
09/15/21 - 09/21/21	< 14	< 14	*(1)*	< 15	
09/20/21 - 09/27/21					< 28
09/21/21 - 09/28/21	< 23	< 22	< 24	< 22	
09/27/21 - 10/04/21					< 17
09/28/21 - 10/05/21	< 55	< 57	< 57	< 57	
10/04/21 - 10/11/21					< 28
10/05/21 - 10/12/21	< 58	< 58	< 58	< 58	
10/11/21 - 10/18/21					< 17
10/12/21 - 10/19/21	< 41	< 41	< 41	< 41	
10/18/21 - 10/25/21					< 34
10/19/21 - 10/26/21	< 44	< 41	< 44	< 40	
10/25/21 - 11/01/21					< 14
10/26/21 - 11/02/21	< 27	< 25	< 53	< 25	
11/01/21 - 11/08/21					< 22
11/02/21 - 11/09/21	< 22	< 22	< 22	< 22	
11/08/21 - 11/15/21					< 17
11/09/21 - 11/16/21	< 44	< 18	< 43	< 43	
11/15/21 - 11/22/21					< 21
11/16/21 - 11/23/21	< 61	< 60	< 60	< 60	
11/22/21 - 11/29/21					< 17
11/23/21 - 11/30/21	< 11	< 23	< 23	< 23	
11/29/21 - 12/06/21					< 21
11/30/21 - 12/07/21	< 23	< 24	< 23	< 23	
12/06/21 - 12/13/21					< 12
12/07/21 - 12/14/21	< 57	< 50	< 57	< 19	
12/13/21 - 12/20/21					< 22
12/14/21 - 12/21/21	< 48	< 48	< 47	< 48	
12/20/21 - 12/28/21					< 13
12/21/21 - 12/29/21	< 18	< 18	< 21	< 16	
12/28/21 - 01/03/22					< 15
12/29/21 - 01/04/22	< 22	< 23	< 22	< 23	
MEAN	-	-	-	-	-

(1) SEE PROGRAM EXCEPTIONS SECTION FOR EXPLANATION

Table C-VII.1

CONCENTRATIONS OF LOW LEVEL I-131 IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION	CONTROL FARMS			INDICATOR FARMS							
WEEK	C	E	V	D	J	P	R	S	W	X	Y
01/14/21			< 0.9		< 0.8		< 0.4	< 0.4		< 0.9	
02/10/21	< 0.5	< 0.7	< 0.6	< 0.7	< 0.8	< 0.6	< 0.9	< 0.7	< 0.5	< 0.8	< 0.9
03/11/21			< 0.8		< 0.9		< 0.8	< 0.7		< 0.8	
04/08/21			< 0.9		< 0.9		< 0.9	< 0.7		< 0.7	
04/21/21			< 0.8		< 0.9		< 0.9	< 0.9		< 0.9	
05/06/21	< 0.8	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.8	< 0.8
05/20/21			< 0.8		< 0.9		< 0.9	< 0.9		< 0.9	
06/03/21			< 0.8		< 0.9		< 0.9	< 0.8		< 0.9	
06/18/21			< 0.7		< 0.5		< 0.5	< 0.6		< 0.7	
07/01/21			< 0.9		< 0.8		< 0.9	< 0.8		< 0.8	
07/15/21			< 0.8		< 0.8		< 0.9	< 0.9		< 0.8	
07/30/21			< 0.8		< 0.8		< 0.8	< 0.8		< 0.8	
08/12/21	< 0.8	< 0.8	< 0.8	< 0.9	< 0.9	< 0.8	< 0.8	< 0.8	< 0.9	< 0.7	< 0.9
08/26/21			< 0.9		< 1.0		< 0.8	< 0.9		< 0.8	
09/08/21			< 0.9		< 0.8		< 0.9	< 0.9		< 0.8	
09/23/21			< 0.5		< 0.7		< 0.8	< 0.7		< 0.9	
10/08/21			< 0.9		< 0.7		< 0.9	< 0.9		< 0.6	
10/21/21			< 0.8		< 0.9		< 0.8	< 0.8		< 0.9	
11/04/21	< 0.9	< 0.8	< 0.8	< 0.8	< 0.9	< 0.8	< 0.9	< 0.7	< 0.8	< 0.8	< 0.6
11/16/21			< 0.8		< 0.8		< 0.8	< 0.9		< 0.9	
12/01/21			< 0.8		< 0.9		< 0.8	< 0.8		< 0.8	
MEAN	-	-	-	-	-	-	-	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
C	02/09/21	1192 ± 187	< 9	< 10	< 41	< 11
	05/06/21	1280 ± 164	< 7	< 7	< 36	< 9
	08/11/21	1319 ± 160	< 8	< 7	< 29	< 9
	11/04/21	1246 ± 188	< 9	< 6	< 21	< 6
MEAN ± 2 STD DEV		1259 ± 108	-	-	-	-
E	02/10/21	1184 ± 206	< 10	< 6	< 31	< 14
	05/06/21	1262 ± 190	< 10	< 9	< 44	< 4
	08/11/21	1398 ± 204	< 11	< 9	< 33	< 10
	11/03/21	1206 ± 172	< 9	< 9	< 31	< 9
MEAN ± 2 STD DEV		1262 ± 233	-	-	-	-
V	01/14/21	1323 ± 138	< 7	< 5	< 25	< 8
	02/10/21	1121 ± 171	< 6	< 8	< 28	< 11
	03/11/21	1246 ± 188	< 9	< 10	< 25	< 15
	04/08/21	1087 ± 199	< 9	< 7	< 35	< 13
	04/21/21	1139 ± 189	< 10	< 8	< 26	< 14
	05/05/21	1160 ± 160	< 9	< 7	< 29	< 11
	05/20/21	1172 ± 187	< 8	< 7	< 28	< 9
	06/03/21	1309 ± 181	< 10	< 7	< 43	< 13
	06/17/21	1382 ± 173	< 7	< 7	< 22	< 7
	07/01/21	1344 ± 185	< 8	< 7	< 36	< 7
	07/15/21	1435 ± 187	< 8	< 6	< 28	< 9
	07/29/21	1276 ± 195	< 9	< 8	< 35	< 9
	08/11/21	1361 ± 190	< 10	< 10	< 41	< 14
	08/26/21	1237 ± 187	< 9	< 8	< 41	< 10
	09/08/21	1282 ± 139	< 7	< 6	< 23	< 9
	09/23/21	1242 ± 145	< 4	< 5	< 20	< 8
	10/07/21	1163 ± 179	< 9	< 9	< 29	< 8
	10/21/21	1131 ± 172	< 8	< 8	< 38	< 11
	11/04/21	1136 ± 178	< 7	< 7	< 35	< 5
	11/16/21	1274 ± 139	< 6	< 6	< 29	< 9
	12/01/21	1391 ± 211	< 13	< 11	< 47	< 12
MEAN ± 2 STD DEV		1248 ± 204	-	-	-	-
D	02/09/21	1356 ± 190	< 7	< 8	< 30	< 7
	05/05/21	1279 ± 200	< 10	< 8	< 33	< 9
	08/11/21	1279 ± 176	< 10	< 9	< 39	< 10
	11/03/21	1287 ± 175	< 8	< 7	< 29	< 10
MEAN ± 2 STD DEV		1300 ± 75	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
J	01/14/21	1384 ± 154	< 7	< 6	< 24	< 8
	02/10/21	1261 ± 116	< 5	< 5	< 20	< 7
	03/11/21	1292 ± 183	< 9	< 10	< 37	< 9
	04/08/21	1296 ± 184	< 9	< 10	< 38	< 9
	04/21/21	1187 ± 177	< 9	< 8	< 32	< 11
	05/05/21	1157 ± 177	< 8	< 9	< 38	< 9
	05/20/21	1109 ± 171	< 8	< 7	< 33	< 11
	06/03/21	1247 ± 175	< 8	< 10	< 35	< 14
	06/18/21	1213 ± 165	< 8	< 8	< 33	< 13
	07/01/21	1234 ± 148	< 9	< 7	< 34	< 10
	07/15/21	1197 ± 173	< 9	< 8	< 26	< 9
	07/30/21	1871 ± 218	< 10	< 8	< 37	< 10
	08/11/21	1257 ± 182	< 9	< 8	< 21	< 10
	08/26/21	1336 ± 179	< 9	< 9	< 32	< 10
	09/08/21	1380 ± 159	< 8	< 6	< 24	< 8
	09/23/21	1312 ± 191	< 9	< 6	< 28	< 8
	10/08/21	1222 ± 175	< 8	< 8	< 33	< 10
	10/21/21	1322 ± 184	< 7	< 7	< 37	< 11
	11/03/21	1248 ± 158	< 7	< 7	< 29	< 8
	11/16/21	1002 ± 165	< 7	< 8	< 31	< 10
	12/01/21	1258 ± 180	< 10	< 9	< 34	< 12
MEAN ± 2 STD DEV		1275 ± 325	-	-	-	-
P	02/09/21	1280 ± 187	< 10	< 6	< 38	< 11
	05/05/21	990 ± 179	< 7	< 10	< 31	< 14
	08/11/21	1179 ± 144	< 6	< 8	< 30	< 9
	11/03/21	1098 ± 141	< 9	< 8	< 34	< 10
MEAN ± 2 STD DEV		1137 ± 246	-	-	-	-
R	01/14/21	982 ± 122	< 7	< 5	< 27	< 8
	02/09/21	1239 ± 143	< 7	< 7	< 21	< 8
	03/11/21	1413 ± 174	< 7	< 8	< 27	< 10
	04/08/21	1236 ± 177	< 7	< 6	< 23	< 10
	04/21/21	1172 ± 151	< 7	< 7	< 26	< 7
	05/05/21	1273 ± 180	< 9	< 10	< 47	< 11
	05/20/21	1184 ± 161	< 7	< 6	< 28	< 10
	06/03/21	1301 ± 195	< 9	< 10	< 41	< 6
	06/17/21	1271 ± 146	< 7	< 7	< 30	< 8
	07/01/21	1212 ± 200	< 10	< 7	< 34	< 10
	07/15/21	1062 ± 173	< 9	< 9	< 34	< 12
	07/29/21	1343 ± 152	< 6	< 7	< 32	< 9
	08/12/21	1391 ± 188	< 7	< 8	< 31	< 8
	08/26/21	1178 ± 176	< 9	< 10	< 36	< 11
	09/08/21	1262 ± 152	< 5	< 6	< 26	< 6
	09/23/21	1344 ± 175	< 7	< 6	< 26	< 9
	10/07/21	1188 ± 190	< 11	< 9	< 32	< 11
	10/21/21	973 ± 183	< 8	< 9	< 35	< 7
	11/03/21	1282 ± 177	< 7	< 7	< 35	< 10
	11/16/21	1435 ± 180	< 7	< 7	< 34	< 12
	12/01/21	1268 ± 181	< 9	< 7	< 33	< 8
MEAN ± 2 STD DEV		1239 ± 247	-	-	-	-

Table C-VII.2 CONCENTRATIONS OF GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION PERIOD	K-40	Cs-134	Cs-137	Ba-140	La-140
S	01/14/21	1154 ± 182	< 9	< 8	< 34	< 6
	02/09/21	1287 ± 170	< 7	< 6	< 28	< 10
	03/11/21	1165 ± 204	< 8	< 7	< 27	< 7
	04/08/21	1203 ± 183	< 8	< 8	< 32	< 11
	04/21/21	1126 ± 188	< 9	< 9	< 32	< 12
	05/05/21	1191 ± 184	< 7	< 8	< 32	< 9
	05/20/21	1336 ± 184	< 8	< 8	< 37	< 7
	06/03/21	1327 ± 184	< 10	< 9	< 41	< 6
	06/17/21	1339 ± 168	< 8	< 7	< 35	< 9
	07/01/21	1295 ± 197	< 8	< 6	< 34	< 9
	07/15/21	1182 ± 170	< 8	< 7	< 31	< 10
	07/29/21	1116 ± 172	< 9	< 8	< 34	< 12
	08/11/21	1322 ± 186	< 8	< 9	< 42	< 12
	08/26/21	1160 ± 173	< 9	< 7	< 38	< 10
	09/08/21	1194 ± 131	< 5	< 6	< 20	< 8
	09/23/21	1368 ± 158	< 9	< 7	< 30	< 5
	10/07/21	1251 ± 145	< 7	< 7	< 27	< 8
	10/21/21	1305 ± 192	< 11	< 8	< 34	< 9
	11/03/21	1220 ± 197	< 10	< 7	< 38	< 13
	11/16/21	1178 ± 171	< 9	< 6	< 37	< 9
	12/01/21	1348 ± 164	< 8	< 7	< 25	< 9
MEAN ± 2 STD DEV		1241 ± 163	-	-	-	-
W	02/09/21	1089 ± 160	< 8	< 7	< 38	< 9
	05/05/21	1199 ± 192	< 10	< 10	< 42	< 11
	08/12/21	1268 ± 183	< 11	< 11	< 44	< 12
	11/04/21	1270 ± 160	< 7	< 7	< 28	< 10
MEAN ± 2 STD DEV		1207 ± 170	-	-	-	-
X	01/14/21	1258 ± 191	< 9	< 8	< 37	< 14
	02/09/21	1343 ± 188	< 9	< 9	< 48	< 7
	03/11/21	1308 ± 214	< 12	< 7	< 37	< 13
	04/08/21	1300 ± 179	< 8	< 8	< 25	< 11
	04/21/21	1455 ± 159	< 7	< 7	< 28	< 8
	05/05/21	1224 ± 187	< 10	< 8	< 43	< 6
	05/20/21	1320 ± 220	< 8	< 7	< 34	< 10
	06/03/21	1213 ± 177	< 9	< 8	< 37	< 9
	06/17/21	1186 ± 178	< 9	< 7	< 33	< 6
	07/01/21	1156 ± 193	< 10	< 9	< 45	< 10
	07/15/21	1220 ± 156	< 7	< 7	< 29	< 7
	07/29/21	1237 ± 176	< 6	< 7	< 33	< 13
	08/11/21	1205 ± 144	< 5	< 5	< 26	< 8
	08/26/21	1101 ± 190	< 10	< 9	< 40	< 14
	09/08/21	1212 ± 137	< 6	< 6	< 19	< 8
	09/23/21	979 ± 146	< 9	< 8	< 30	< 8
	10/07/21	1141 ± 180	< 9	< 9	< 38	< 9
	10/21/21	1145 ± 149	< 8	< 8	< 29	< 9
	11/03/21	1087 ± 149	< 7	< 7	< 26	< 6
	11/16/21	1074 ± 152	< 8	< 7	< 37	< 14
	12/01/21	1073 ± 159	< 8	< 8	< 34	< 9
MEAN ± 2 STD DEV		1202 ± 219	-	-	-	-
Y	02/09/21	1295 ± 139	< 5	< 5	< 27	< 8
	05/05/21	1337 ± 182	< 9	< 9	< 37	< 14
	08/11/21	1280 ± 191	< 10	< 10	< 38	< 10
	11/03/21	1302 ± 174	< 9	< 10	< 37	< 9
MEAN ± 2 STD DEV		1304 ± 48	-	-	-	-

Table C-VIII.1 CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		Be-7	K-40	Mn-54	Co-58	Co-60	I-131	Cs-134	Cs-137
1C	06/30/21	*Corn Leaves*	785 ± 203	1655 ± 369	< 22	< 17	< 21	< 21	< 27	< 25
	06/30/21	*Broccoli Leaves*	1463 ± 243	1142 ± 367	< 25	< 22	< 14	< 28	< 28	< 27
	06/30/21	*Collards*	< 288	3044 ± 536	< 28	< 24	< 28	< 28	< 29	< 30
	07/15/21	*Corn Leaves*	1590 ± 378	2941 ± 546	< 24	< 22	< 16	< 28	< 34	< 32
	07/15/21	*Collards*	< 318	3390 ± 519	< 25	< 26	< 23	< 29	< 29	< 29
	07/15/21	*Swiss Chard*	379 ± 136	4519 ± 367	< 16	< 15	< 18	< 17	< 18	< 17
	08/26/21	*Swiss Chard*	812 ± 313	5684 ± 854	< 30	< 37	< 39	< 38	< 40	< 41
	08/26/21	*Cabbage*	< 268	3533 ± 614	< 33	< 29	< 29	< 40	< 29	< 30
	08/26/21	*Broccoli Leaves*	< 262	2309 ± 502	< 22	< 16	< 24	< 24	< 27	< 17
	09/22/21	*Swiss Chard*	< 434	5185 ± 866	< 38	< 36	< 36	< 52	< 43	< 36
	09/22/21	*Collards*	271 ± 192	2195 ± 554	< 26	< 28	< 27	< 39	< 33	< 32
	09/22/21	*Cabbage*	< 313	3582 ± 733	< 46	< 31	< 37	< 42	< 37	< 37
		MEAN ± 2 STD DEV	883 ± 1088	3265 ± 2738	-	-	-	-	-	-
2Q	06/24/21	*Broccoli Leaves*	485 ± 199	4519 ± 585	< 23	< 28	< 27	< 28	< 26	< 27
	06/24/21	*Collards*	431 ± 159	4734 ± 530	< 20	< 20	< 26	< 23	< 19	< 20
	06/24/21	*Cabbage*	269 ± 137	4747 ± 488	< 16	< 19	< 18	< 23	< 20	< 19
	07/15/21	*Collards*	< 244	3877 ± 558	< 19	< 22	< 30	< 22	< 28	< 25
	07/15/21	*Cabbage*	< 229	4249 ± 527	< 21	< 20	< 27	< 24	< 23	< 25
	07/15/21	*Broccoli Leaves*	< 339	3256 ± 551	< 29	< 31	< 26	< 37	< 32	< 31
	08/26/21	*Swiss Chard*	609 ± 242	6692 ± 724	< 28	< 30	< 37	< 45	< 37	< 30
	08/26/21	*Cabbage*	< 263	3691 ± 582	< 28	< 24	< 29	< 40	< 31	< 31
	08/26/21	*Broccoli Leaves*	< 239	2754 ± 429	< 22	< 20	< 21	< 27	< 23	< 22
	09/22/21	*Swiss Chard*	< 363	6628 ± 801	< 32	< 27	< 31	< 40	< 34	< 31
	09/22/21	*Collards*	< 363	3266 ± 583	< 27	< 25	< 30	< 35	< 36	< 25
	09/22/21	*Cabbage*	< 358	2964 ± 579	< 27	< 23	< 31	< 41	< 31	< 26
		MEAN ± 2 STD DEV	448 ± 282	4281 ± 2591	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-VIII.1

CONCENTRATIONS OF GAMMA EMITTERS IN FOOD PRODUCT SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/KG WET ± 2 SIGMA

SITE	COLLECTION PERIOD		Be-7	K-40	Mn-54	Co-58	Co-60	I-131	Cs-134	Cs-137
3Q	06/24/21	*Cabbage*	< 254	3009 ± 571	< 26	< 31	< 18	< 30	< 31	< 33
	06/24/21	*Swiss Chard*	415 ± 193	7605 ± 673	< 25	< 25	< 28	< 30	< 27	< 27
	06/24/21	*Collards*	< 249	5403 ± 751	< 22	< 33	< 30	< 25	< 33	< 31
	07/15/21	*Collards*	< 167	4382 ± 361	< 18	< 17	< 20	< 19	< 21	< 19
	07/15/21	*Broccoli Leaves*	< 333	3247 ± 491	< 27	< 25	< 29	< 38	< 34	< 29
	07/15/21	*Cabbage*	< 297	3260 ± 586	< 24	< 23	< 26	< 29	< 30	< 22
	08/26/21	*Swiss Chard*	1301 ± 334	6538 ± 769	< 40	< 26	< 36	< 54	< 41	< 33
	08/26/21	*Cabbage*	1474 ± 433	4993 ± 711	< 39	< 42	< 36	< 46	< 48	< 32
	08/26/21	*Collards*	356 ± 247	3592 ± 585	< 27	< 21	< 35	< 43	< 29	< 34
	09/22/21	*Swiss Chard*	< 367	6134 ± 804	< 32	< 31	< 42	< 51	< 37	< 35
	09/22/21	*Cauliflower Leaves*	< 278	5174 ± 690	< 28	< 30	< 26	< 41	< 32	< 31
	09/22/21	*Corn Leaves*	4611 ± 495	6271 ± 709	< 33	< 33	< 37	< 45	< 26	< 28
		MEAN ± 2 STD DEV	1631 ± 3481	4967 ± 2995	-	-	-	-	-	-
55	06/24/21	*Cabbage*	< 295	4051 ± 609	< 36	< 20	< 29	< 37	< 40	< 32
	06/24/21	*Collards*	389 ± 159	3616 ± 468	< 18	< 23	< 22	< 23	< 21	< 21
	06/24/21	*Swiss Chard*	510 ± 275	7080 ± 839	< 27	< 28	< 29	< 38	< 29	< 32
	07/15/21	*Cabbage*	482 ± 148	4443 ± 440	< 20	< 11	< 16	< 20	< 18	< 15
	07/15/21	*Swiss Chard*	595 ± 343	9617 ± 1076	< 41	< 30	< 39	< 42	< 32	< 32
	07/15/21	*Collards*	373 ± 196	4823 ± 724	< 25	< 19	< 19	< 35	< 27	< 27
	08/26/21	*Swiss Chard*	1017 ± 260	6093 ± 800	< 33	< 32	< 26	< 49	< 34	< 29
	08/26/21	*Corn Leaves*	3677 ± 437	6424 ± 748	< 33	< 31	< 32	< 42	< 33	< 28
	08/26/21	*Zucchini Leaves*	1825 ± 368	5496 ± 793	< 28	< 38	< 36	< 42	< 35	< 30
	09/22/21	*Swiss Chard*	< 361	6393 ± 782	< 33	< 29	< 28	< 49	< 33	< 40
		MEAN ± 2 STD DEV	1108 ± 2292	5804 ± 3512	-	-	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

Table C-IX.1 QUARTERLY DLR RESULTS FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

Monitoring Location	Location Quarterly Baseline, B_Q (mrem)	B_Q + MDD_Q (1) (mrem)	2020 Normalized Net Dose, M_{QX} (mrem/std. qtr.)				Quarterly Facility Dose, F_Q (mrem)			
			1	2	3	4	1	2	3	4
P-TLD-14	23.2	28.6	22.8	23.3	24.6	21.8	ND	ND	ND	ND
P-TLD-15	23.9	29.3	22.7	25.4	25.3	23.7	ND	ND	ND	ND
P-TLD-16	23.4	28.8	20.4	22.9	23.5	21.4	ND	ND	ND	ND
P-TLD-17	27.2	32.6	24.8	27.6	30.0	25.9	ND	ND	ND	ND
P-TLD-18	23.9	29.3	21.1	25.6	24.3	25.3	ND	ND	ND	ND
P-TLD-19	20.8	26.2	19.6	19.4	19.5	18.7	ND	ND	ND	ND
P-TLD-1A	23.8	29.2	25.8	27.1	24.6	24.8	ND	ND	ND	ND
P-TLD-1B	20.2	25.6	18.4	20.3	21.8	20.1	ND	ND	ND	ND
P-TLD-1C	24.1	29.5	24.4	24.7	24.6	24.1	ND	ND	ND	ND
P-TLD-1D	23.4	28.8	21.1	21.7	22.7	18.1	ND	ND	ND	ND
P-TLD-1E	22.8	28.2	22.3	23.8	22.9	23.2	ND	ND	ND	ND
P-TLD-1F	27	32.4	27.2	27.5	28.2	25.8	ND	ND	ND	ND
P-TLD-1G	15.9	21.3	13.8	14.6	15.6	14.9	ND	ND	ND	ND
P-TLD-1H	23.6	29.0	23.5	22.9	24.6	22.7	ND	ND	ND	ND
P-TLD-1I	21.4	26.8	19.6	21.7	21.8	20.9	ND	ND	ND	ND
P-TLD-1J	27.3	32.7	28.3	26.3	28.6	27.5	ND	ND	ND	ND
P-TLD-1K	26.4	31.8	26.1	25.2	27.2	27.2	ND	ND	ND	ND
P-TLD-1L	19.4	24.8	23.9	25.6	23.9	21.6	ND	6.2	ND	ND
P-TLD-1M	14	19.4	14.7	13.9	14.4	14.4	ND	ND	ND	ND
P-TLD-1NN	25.5	30.9	26.0	24.7	29.1	24.8	ND	ND	ND	ND
P-TLD-1P	16.1	21.5	16.4	18.2	18.3	17.0	ND	ND	ND	ND
P-TLD-1Q	18.7	24.1	18.1	18.8	20.4	18.7	ND	ND	ND	ND
P-TLD-1R(*)	32.9	38.3	33.5	34.4	36.5	33.6	ND	ND	ND	ND
P-TLD-1T	24.7	30.1	23.1	24.1	25.8	22.3	ND	ND	ND	ND
P-TLD-2	23	28.4	23.8	22.6	24.3	24.5	ND	ND	ND	ND
P-TLD-22	24.3	29.7	22.6	23.6	25.3	22.0	ND	ND	ND	ND
P-TLD-23	24.9	30.3	23.6	25.6	26.7	25.0	ND	ND	ND	ND
P-TLD-24	18.1	23.5	16.9	16.8	17.4	15.4	ND	ND	ND	ND
P-TLD-26	26	31.4	21.7	24.7	22.7	25.8	ND	ND	ND	ND
P-TLD-27	24.7	30.1	22.9	24.4	26.0	24.2	ND	ND	ND	ND
P-TLD-2B(**)	22.1	27.5	21.9	22.7	23.8	21.1	ND	ND	ND	ND
P-TLD-31A	19.9	25.3	19.5	20.6	21.4	18.5	ND	ND	ND	ND
P-TLD-32	25.4	30.8	24.7	25.2	26.6	25.1	ND	ND	ND	ND
P-TLD-3A	17.3	22.7	17.1	17.2	17.6	17.2	ND	ND	ND	ND
P-TLD-40	27.8	33.2	28.9	28.6	29.4	27.4	ND	ND	ND	ND
P-TLD-42	21	26.4	19.3	23.6	22.9	21.1	ND	ND	ND	ND
P-TLD-43	26.5	31.9	25.5	26.7	27.4	26.4	ND	ND	ND	ND
P-TLD-44	22.8	28.2	21.2	23.3	23.4	20.8	ND	ND	ND	ND
P-TLD-45	24.5	29.9	24.4	24.9	23.9	23.5	ND	ND	ND	ND
P-TLD-46	21	26.4	21.4	21.4	21.9	22.3	ND	ND	ND	ND
P-TLD-47	26	31.4	26.4	27.2	27.2	25.7	ND	ND	ND	ND
P-TLD-48	24.3	29.7	23.9	23.9	24.7	22.9	ND	ND	ND	ND
P-TLD-49	24	29.4	24.2	24.5	23.1	23	ND	ND	ND	ND
P-TLD-4K	15.1	20.5	14.5	15.8	15.8	14.5	ND	ND	ND	ND
P-TLD-5	22	27.4	22.1	22.5	23	19.7	ND	ND	ND	ND
P-TLD-50	28.1	33.5	27.5	27.1	28.5	26.2	ND	ND	ND	ND
P-TLD-51	23.6	29.0	23.6	22.5	26.5	24.9	ND	ND	ND	ND
P-TLD-6B	19.8	25.2	20.9	19.1	21.2	19.2	ND	ND	ND	ND

(1) **Minimum Differential Dose (MDD_Q)**: The smallest amount of facility-related dose above the background dose (quarterly)

(*) 1R is the dosimeter closest to the ISFSI (**) 2B is the closest resident to the plant and ISFSI

Table C-IX.2 ANNUAL DLR RESULTS FOR PEACH BOTTOM ATOMIC POWER STATION, 2021

Monitoring Location	Annual Baseline, B_A (mrem)	$B_A + MDD_A$[(1)] (mrem)	Normalized Annual Dose, M_A (mrem/yr)	Annual Facility Dose, F_A
P-TLD-14	92.8	108.9	92.5	ND
P-TLD-15	95.5	111.6	97.1	ND
P-TLD-16	93.7	109.8	88.2	ND
P-TLD-17	108.9	125.0	108.3	ND
P-TLD-18	95.5	111.6	96.3	ND
P-TLD-19	83.2	99.3	77.2	ND
P-TLD-1A	95	111.1	102.3	ND
P-TLD-1B	80.8	96.9	80.6	ND
P-TLD-1C	96.3	112.4	97.8	ND
P-TLD-1D	93.8	109.9	83.6	ND
P-TLD-1E	91.2	107.3	92.2	ND
P-TLD-1F	108	124.1	108.7	ND
P-TLD-1G	63.4	79.5	58.9	ND
P-TLD-1H	94.4	110.5	93.7	ND
P-TLD-1I	85.6	101.7	84.0	ND
P-TLD-1J	109	125.1	110.7	ND
P-TLD-1K	105.5	121.6	105.7	ND
P-TLD-1L	77.6	93.7	95.0	17.4
P-TLD-1M	56.1	72.2	57.4	ND
P-TLD-1NN	102.1	118.2	104.6	ND
P-TLD-1P	64.6	80.7	69.9	ND
P-TLD-1Q	74.9	91.0	76.0	ND
P-TLD-1R(*)	131.7	147.8	138.0	ND
P-TLD-1T	104.7	120.8	95.3	ND
P-TLD-2	92.2	108.3	95.2	ND
P-TLD-22	97	113.1	93.5	ND
P-TLD-23	99.7	115.8	100.9	ND
P-TLD-24	72.3	88.4	66.5	ND
P-TLD-26	104.1	120.2	94.9	ND
P-TLD-27	98.8	114.9	97.5	ND
P-TLD-2B(**)	88.4	104.5	89.5	ND
P-TLD-31A	79.6	95.7	80.0	ND
P-TLD-32	101.7	117.8	101.6	ND
P-TLD-3A	69.3	85.4	69.1	ND
P-TLD-40	111.2	127.3	114.3	ND
P-TLD-42	84.2	100.3	86.9	ND
P-TLD-43	106.1	122.2	106.0	ND
P-TLD-44	91.3	107.4	88.7	ND
P-TLD-45	98.2	114.3	96.7	ND
P-TLD-46	84.2	100.3	87.0	ND
P-TLD-47	103.8	119.9	106.5	ND
P-TLD-48	97.1	113.2	95.4	ND
P-TLD-49	95.8	111.9	94.8	ND
P-TLD-4K	60.3	76.4	60.6	ND
P-TLD-5	87.8	103.9	87.3	ND
P-TLD-50	112.2	128.3	109.3	ND
P-TLD-51	94.5	110.6	97.5	ND
P-TLD-6B	79.1	95.2	80.4	ND

[(1)] **Minimum Differential Dose (MDD_A)**: The smallest amount of facility-related dose above the background dose (annually)

(*) 1R is the dosimeter closest to the ISFSI (**) 2B is the closest resident to the plant and ISFSI

FIGURE C-1
MONTHLY TOTAL GROSS BETA CONCENTRATIONS IN DRINKING WATER
SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2021

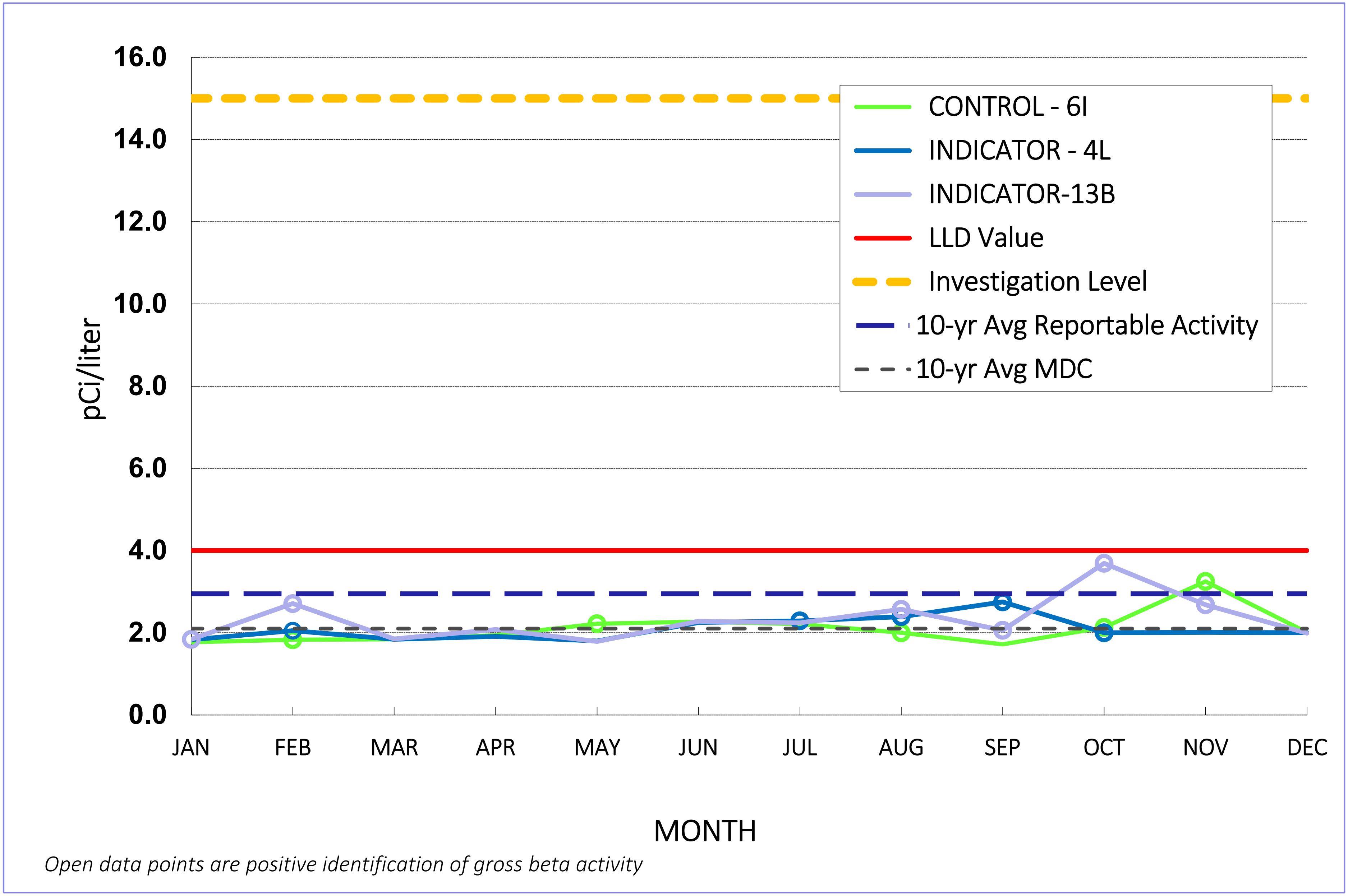


FIGURE C-2
MDC RESULTS FOR FISH SAMPLING COLLECTED IN THE VICINITY OF PBAPS, 2021

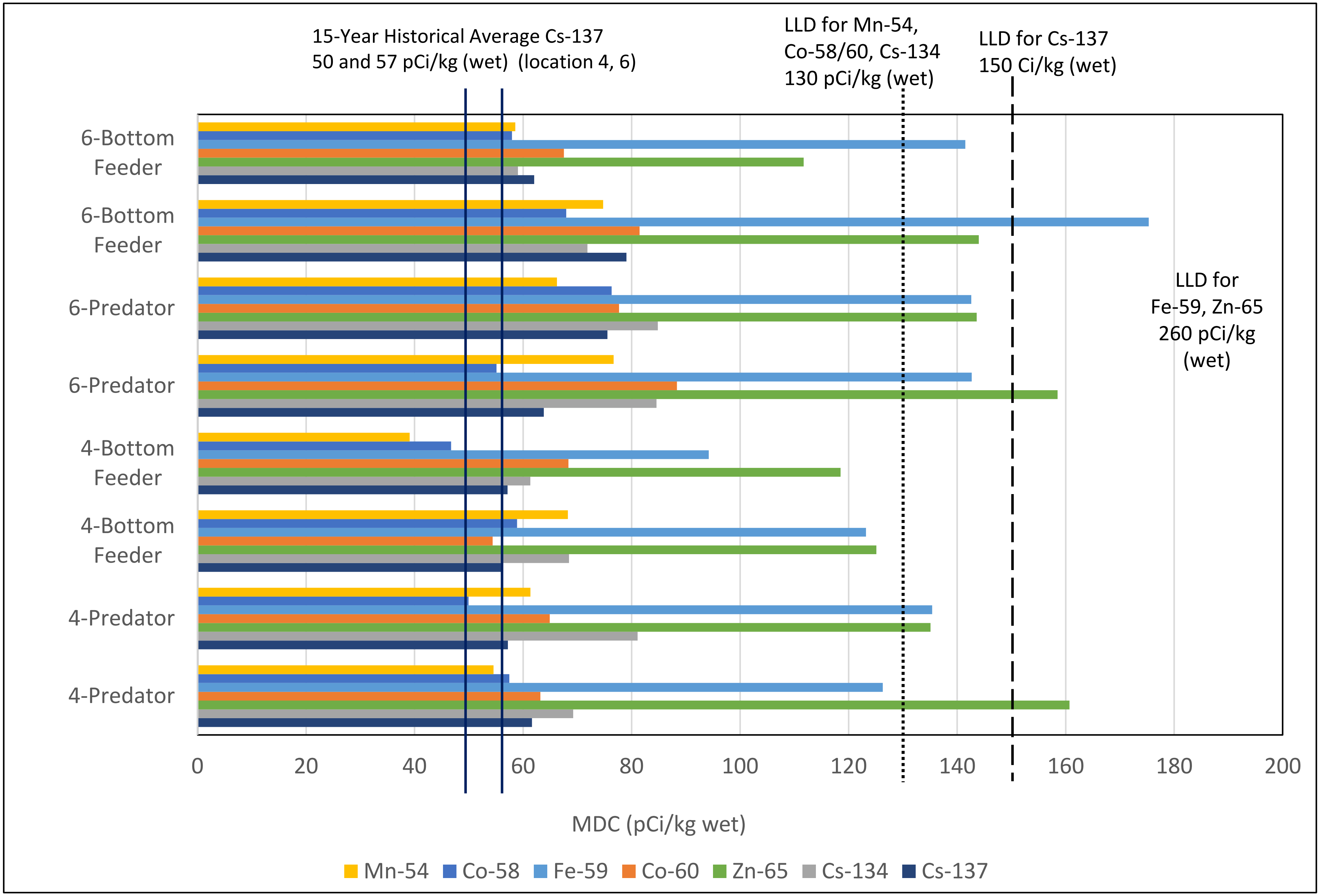


FIGURE C-3
SEMI-ANNUAL CS-137 CONCENTRATIONS IN SEDIMENT SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2021

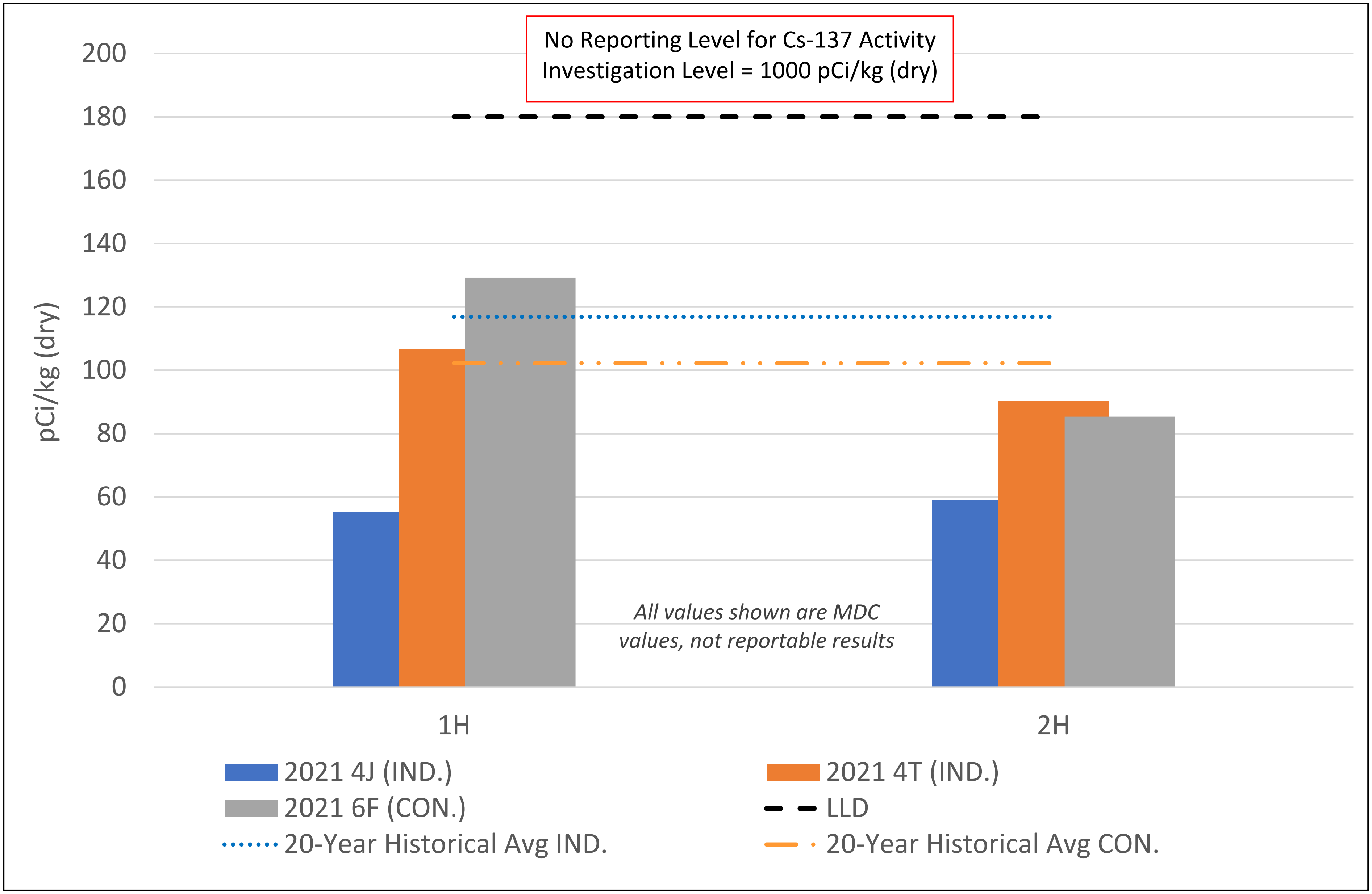
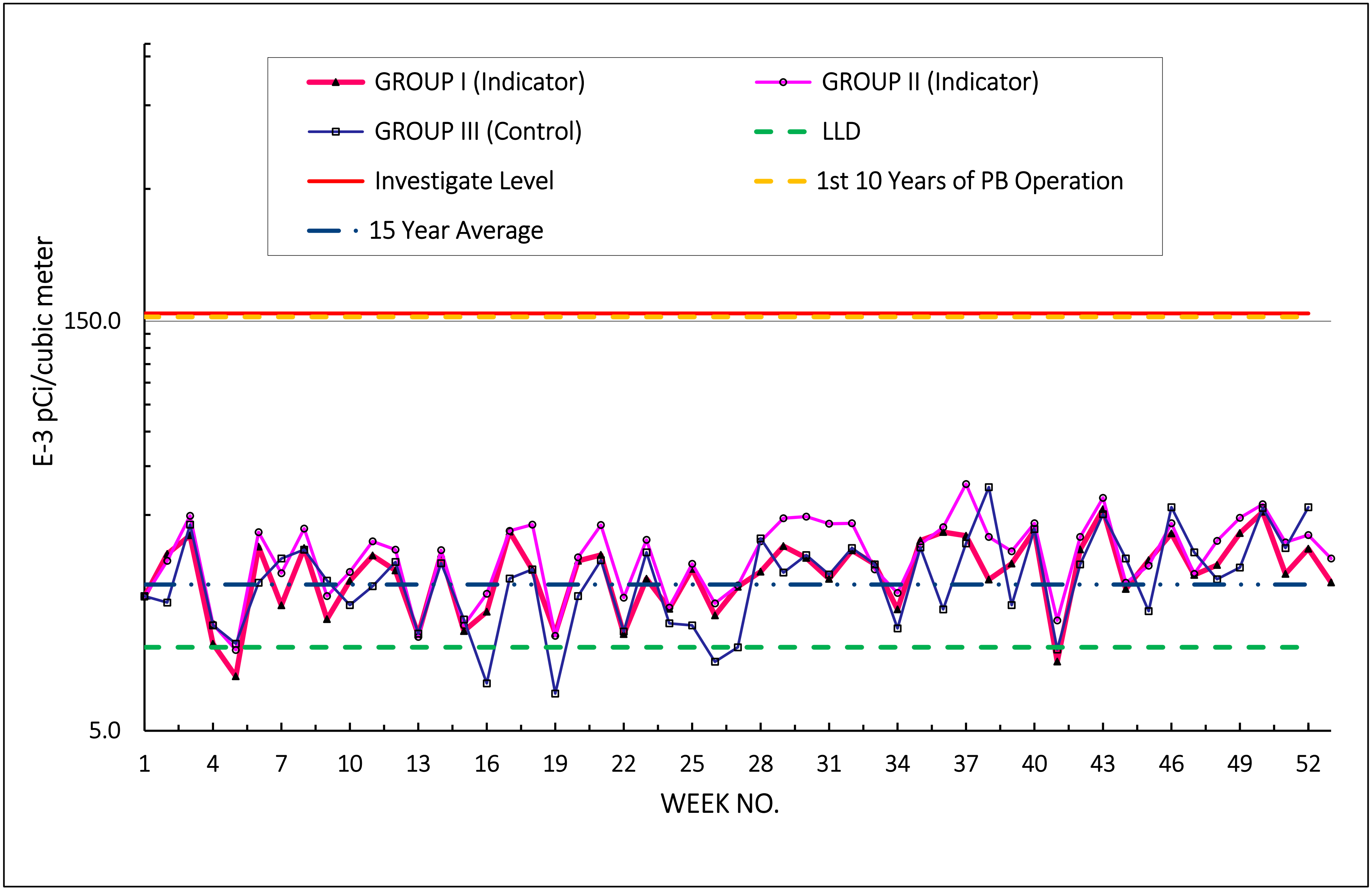


FIGURE C-4
MEAN WEEKLY GROSS BETA CONCENTRATIONS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2021



No Required Reporting Level for Gross Beta Activities

FIGURE C-5
AVERAGE MONTHLY MDC FOR REMP MILK SAMPLES COLLECTED IN THE VICINITY OF PBAPS, 2021

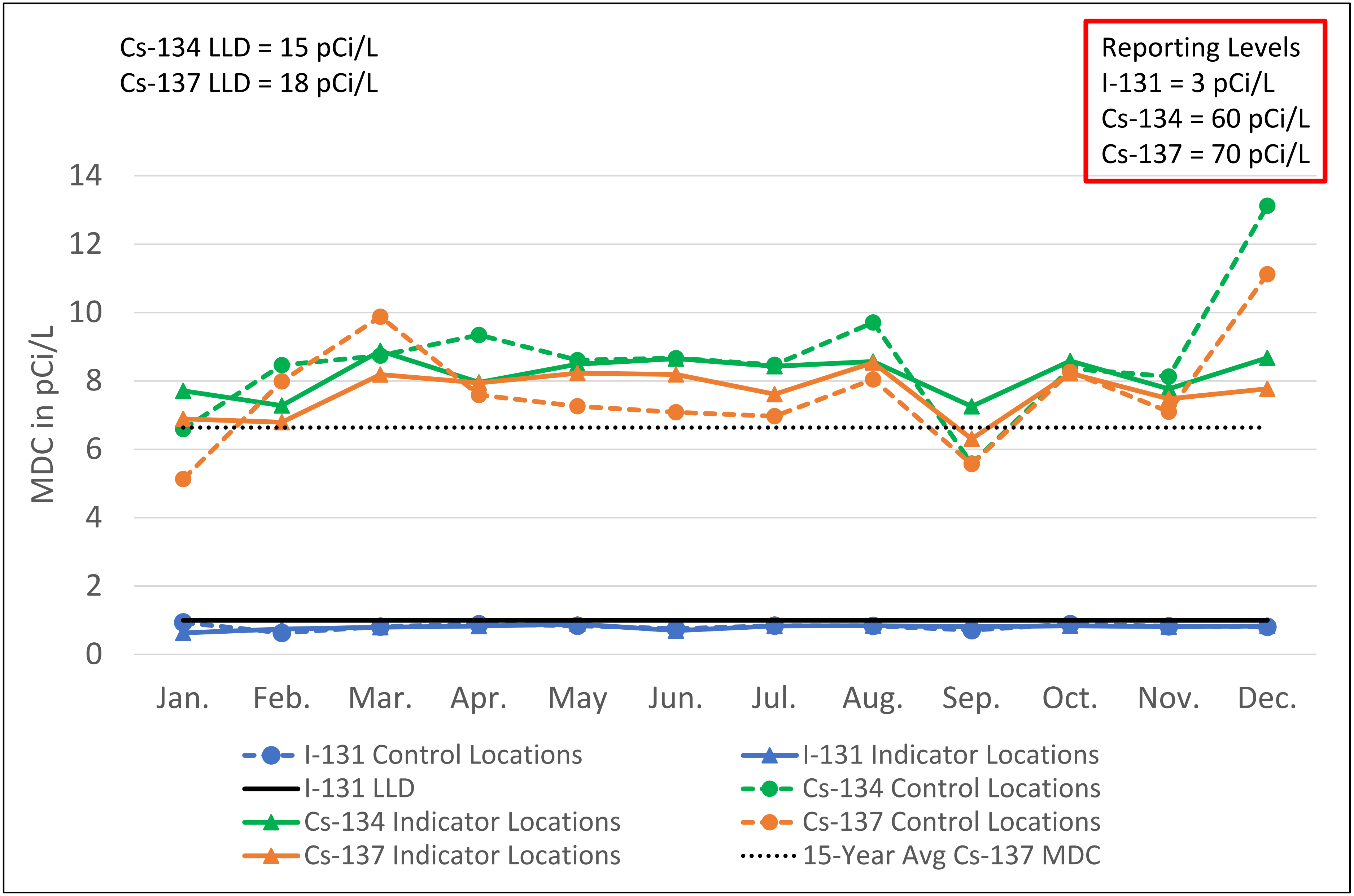
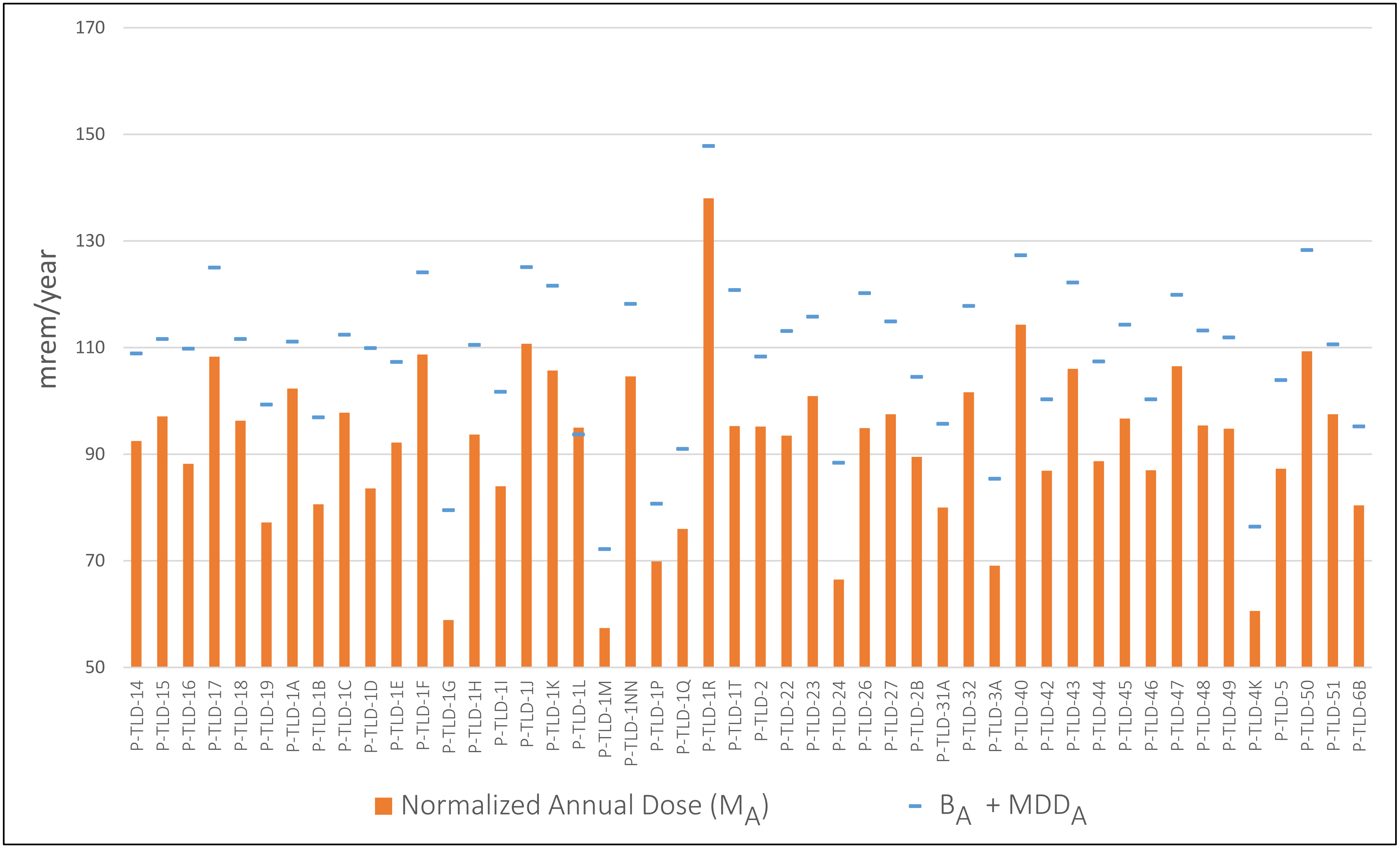


FIGURE C-6
ANNUAL NORMALIZED GAMMA RADIATION RESULTS FROM DOSIMETERS COLLECTED IN THE VICINITY OF PBAPS, 2021



All M_A data less than $B_A + MDD_A$ Annual Facility Dose (F_A) is reported as Non-Detectable (ND)

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APPENDIX D

DATA TABLES AND FIGURES
QC LABORATORIES

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TABLE D-I.1 CONCENTRATIONS OF GROSS BETA IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L *	Lab
12/29/20 - 01/28/21	2.6 ± 0.8	EIS
01/28/21 - 03/02/21	1.5 ± 0.8	EIS
03/02/21 - 03/30/21	1.5 ± 0.7	EIS
03/30/21 - 04/27/21	1.5 ± 0.7	EIS
04/27/21 - 06/02/21	1.9 ± 0.8	EIS
06/02/21 - 06/29/21	1.7 ± 0.8	EIS
06/29/21 - 07/27/21	1.5 ± 0.8	EIS
07/27/21 - 08/31/21	3.0 ± 0.8	EIS
08/31/21 - 09/28/21	1.8 ± 0.8	EIS
09/28/21 - 11/03/21	1.5 ± 0.7	EIS
11/03/21 - 11/30/21	1.9 ± 0.8	EIS
11/30/21 - 01/04/22	1.7 ± 0.8	EIS
MEAN ± 2 STD DEV	1.8 ± 1.0	

TABLE D-I.2 CONCENTRATIONS OF TRITIUM IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L	Lab
12/29/20 - 03/30/21	< 124	GEL
03/30/21 - 06/29/21	< 116	GEL
06/29/21 - 09/28/21	< 123	GEL
09/28/21 - 01/04/22	< 124	GEL
MEAN	-	

TABLE D-I.3 CONCENTRATIONS OF I-131 IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

COLLECTION PERIOD	4L	Lab
12/29/20 - 01/28/21	< 0.8	EIS
01/28/21 - 03/02/21	< 0.8	EIS
03/02/21 - 03/30/21	< 0.8	EIS
03/30/21 - 04/27/21	< 0.6	EIS
04/27/21 - 06/02/21	< 0.5	EIS
06/02/21 - 06/29/21	< 0.9	EIS
06/29/21 - 07/27/21	< 0.6	EIS
07/27/21 - 08/31/21	< 0.8	EIS
08/31/21 - 09/28/21	< 0.6	EIS
09/28/21 - 11/03/21	< 0.8	EIS
11/03/21 - 11/30/21	< 0.8	EIS
11/30/21 - 01/04/22	< 0.6	EIS
MEAN	-	

*All detectable results were less than the required LLD

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

TABLE D-I.4 CONCENTRATIONS OF GAMMA EMITTERS IN DRINKING WATER SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

(Analysis by EIS Laboratory)

SITE	COLLECTION PERIOD	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	Cs-134	Cs-137	Ba-140	La-140
4L	12/29/20 - 01/28/21	< 7	< 12	< 6	< 6	< 14	< 11	< 5	< 5	< 6	< 27	< 9
	01/28/21 - 03/02/21	< 6	< 14	< 5	< 6	< 14	< 10	< 5	< 5	< 5	< 27	< 8
	03/02/21 - 03/30/21	< 6	< 11	< 6	< 7	< 15	< 13	< 8	< 6	< 8	< 33	< 13
	03/30/21 - 04/27/21	< 7	< 14	< 7	< 5	< 14	< 11	< 7	< 6	< 7	< 31	< 12
	04/27/21 - 06/02/21	< 5	< 12	< 5	< 6	< 14	< 8	< 6	< 5	< 6	< 23	< 10
	06/02/21 - 06/29/21	< 4	< 8	< 4	< 5	< 10	< 7	< 5	< 4	< 4	< 25	< 8
	06/29/21 - 07/27/21	< 5	< 13	< 6	< 5	< 14	< 10	< 6	< 5	< 5	< 28	< 12
	07/27/21 - 08/31/21	< 6	< 15	< 5	< 5	< 10	< 9	< 6	< 6	< 6	< 31	< 12
	08/31/21 - 09/28/21	< 6	< 15	< 6	< 6	< 13	< 12	< 7	< 5	< 6	< 34	< 13
	09/28/21 - 11/03/21	< 6	< 15	< 7	< 7	< 15	< 12	< 9	< 7	< 8	< 28	< 12
	11/03/21 - 11/30/21	< 7	< 14	< 8	< 6	< 15	< 12	< 7	< 6	< 7	< 38	< 13
	11/30/21 - 01/04/22	< 6	< 14	< 6	< 7	< 16	< 13	< 7	< 6	< 7	< 26	< 12
	MEAN	-	-	-	-	-	-	-	-	-	-	-

TABLE D-II.1 CONCENTRATIONS OF GROSS BETA IN AIR PARTICULATE AND I-131 IN AIR IODINE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2020

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

(Analysis by EIS Laboratory)

COLLECTION PERIOD	1A GROSS BETA	1A I-131
12/29/20 - 01/06/21	27 ± 2	< 18
01/06/21 - 01/14/21	40 ± 3	< 15
01/14/21 - 01/20/21	38 ± 3	< 29
01/20/21 - 01/28/21	17 ± 2	< 17
01/28/21 - 02/04/21	15 ± 2	< 16
02/04/21 - 02/11/21	40 ± 3	< 22
02/11/21 - 02/17/21	31 ± 3	< 16
02/17/21 - 02/24/21	40 ± 3	< 11
02/24/21 - 03/02/21	21 ± 2	< 26
03/02/21 - 03/09/22	29 ± 2	< 12
03/09/22 - 03/16/22	37 ± 3	< 22
03/16/22 - 03/24/22	29 ± 2	< 26
03/24/22 - 03/30/21	16 ± 2	< 22
03/30/21 - 04/06/21	32 ± 3	< 21
04/06/21 - 04/13/21	19 ± 2	< 16
04/13/21 - 04/21/21	20 ± 2	< 14
04/21/21 - 04/27/21	34 ± 3	< 19
04/27/21 - 05/04/21	34 ± 3	< 16
05/04/21 - 05/11/21	14 ± 2	< 14
05/11/21 - 05/18/21	28 ± 3	< 19
05/18/21 - 05/26/21	33 ± 2	< 14
05/26/21 - 06/02/21	23 ± 2	< 22
06/02/21 - 06/08/21	27 ± 3	< 20
06/08/21 - 06/15/21	15 ± 2	< 32
06/15/21 - 06/22/21	29 ± 2	< 26
06/22/21 - 06/29/21	15 ± 2	< 22
06/29/21 - 07/07/21	24 ± 2	< 18
07/07/21 - 07/13/21	28 ± 3	< 21
07/13/21 - 07/20/21	32 ± 2	< 15
07/20/21 - 07/27/21	34 ± 3	< 18
07/27/21 - 08/03/21	30 ± 2	< 17
08/03/21 - 08/10/21	33 ± 3	< 24
08/10/21 - 08/17/21	27 ± 2	< 16
08/17/21 - 08/24/21	24 ± 2	< 16
08/24/21 - 08/31/21	40 ± 3	< 19
08/31/21 - 09/08/21	47 ± 9	< 10
09/08/21 - 09/15/21	*(1)*	*(1)*
09/15/21 - 09/21/21	*(1)*	*(1)*
09/21/21 - 09/28/21	30 ± 3	< 23
09/28/21 - 10/05/21	41 ± 3	< 13
10/05/21 - 10/12/21	24 ± 2	< 22
10/12/21 - 10/19/21	36 ± 3	< 16
10/19/21 - 10/26/21	46 ± 3	< 13
10/26/21 - 11/02/21	20 ± 2	< 18
11/02/21 - 11/09/21	33 ± 3	< 15
11/09/21 - 11/16/21	33 ± 3	< 17
11/16/21 - 11/23/21	26 ± 2	< 39
11/23/21 - 11/30/21	27 ± 2	< 18
11/30/21 - 12/07/21	36 ± 3	< 26
12/07/21 - 12/14/21	39 ± 3	< 25
12/14/21 - 12/21/21	36 ± 3	< 34
12/21/21 - 12/29/21	48 ± 3	< 13
12/29/21 - 01/04/22	25 ± 3	< 21

TABLE D-II.2 CONCENTRATIONS OF GAMMA EMITTERS IN AIR PARTICULATE SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF E-3 PCI/CU METER ± 2 SIGMA

(Analysis by EIS Laboratory)

SITE	COLLECTION PERIOD	Be-7	Mn-54	Co-58	Co-60	Cs-134	Cs-137
1A	12/29/20 - 03/30/21	75 ± 15	< 2	< 2	< 2	< 2	< 2
	03/30/21 - 06/29/21	91 ± 16	< 2	< 2	< 2	< 1	< 2
	06/29/21 - 09/28/21	82 ± 16	< 2	< 2	< 1	< 2	< 2
	09/28/21 - 12/29/21	87 ± 14	< 1	< 1	< 1	< 1	< 1
	MEAN ± 2 STD DEV	84 ± 14	-	-	-	-	-

TABLE D-III.1 CONCENTRATIONS OF I-131 AND GAMMA EMITTERS IN MILK SAMPLES COLLECTED IN THE VICINITY OF PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

(Analysis by EIS Laboratory)

SITE	COLLECTION PERIOD	I-131	K-40	Cs-134	Cs-137	Ba-140	La-140
J	02/10/21	< 0.8	1490 ± 111	< 4	< 6	< 17	< 5
	05/05/21	< 0.7	1470 ± 140	< 7	< 7	< 33	< 12
	08/11/21	< 0.6	1490 ± 153	< 8	< 9	< 35	< 13
	11/03/21	< 0.7	1410 ± 149	< 8	< 8	< 29	< 8
MEAN ± 2 STD DEV		-	1465 ± 76	-	-	-	-
S	02/09/21	< 0.6	1430 ± 107	< 4	< 5	< 18	< 5
	05/05/21	< 0.7	1410 ± 149	< 7	< 9	< 37	< 12
	08/11/21	< 0.5	1340 ± 137	< 6	< 7	< 27	< 10
	11/03/21	< 0.8	1410 ± 142	< 6	< 7	< 21	< 7
MEAN ± 2 STD DEV		-	1398 ± 79	-	-	-	-
V	02/10/21	< 0.6	1280 ± 989	< 4	< 5	< 17	< 5
	05/05/21	< 0.5	1220 ± 134	< 6	< 6	< 28	< 8
	08/11/21	< 0.6	1330 ± 136	< 6	< 7	< 27	< 9
	11/04/22	< 0.6	1430 ± 142	< 6	< 7	< 22	< 8
MEAN ± 2 STD DEV		-	1315 ± 178	-	-	-	-

THE MEAN AND TWO STANDARD DEVIATION ARE CALCULATED USING THE POSITIVE VALUES

FIGURE D-1

COMPARISON OF MONTHLY TOTAL GROSS BETA CONCENTRATIONS
IN DRINKING WATER SAMPLES FROM STATION 4L
ANALYZED BY THE PRIMARY AND QC LABORATORIES, 2021

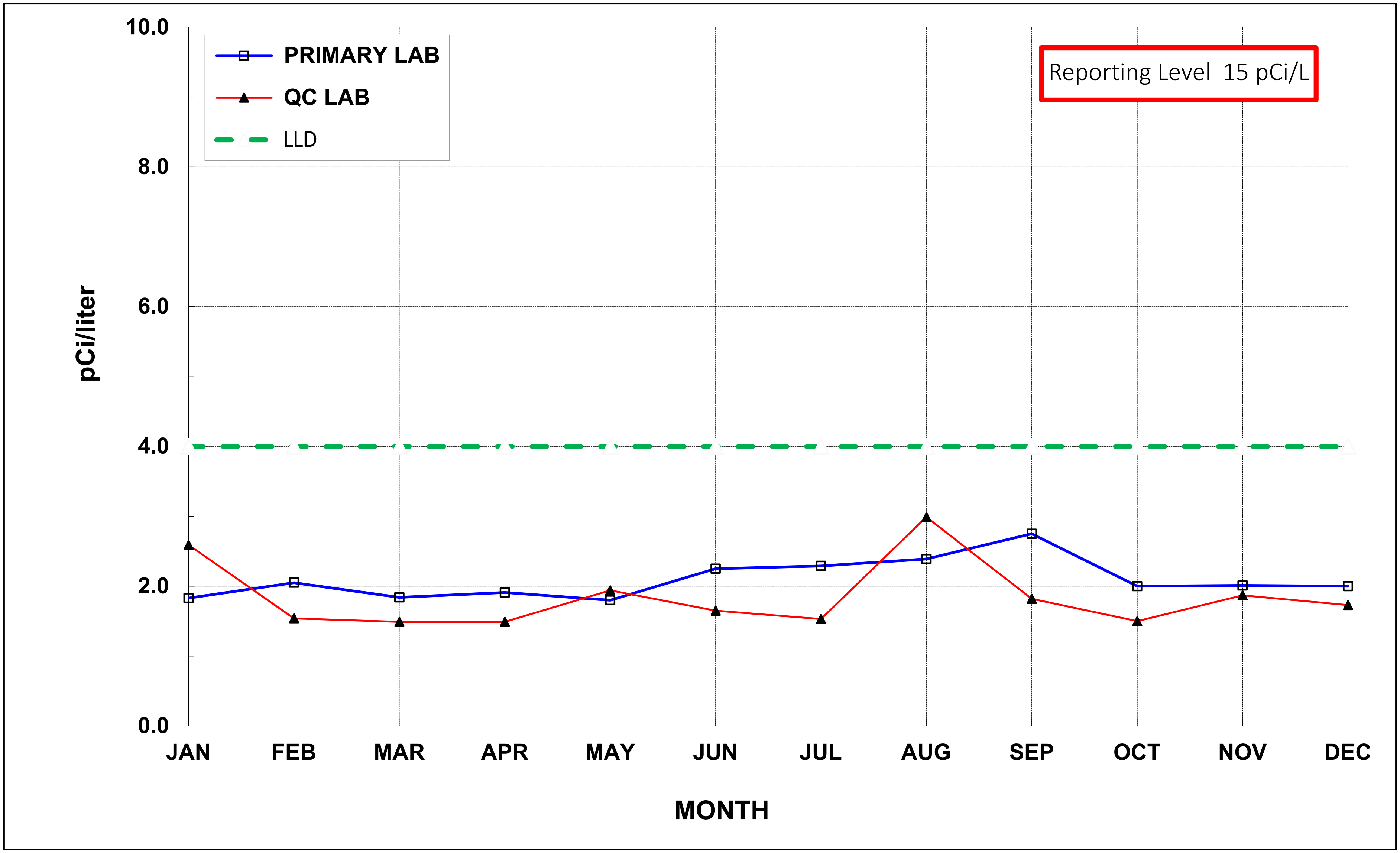
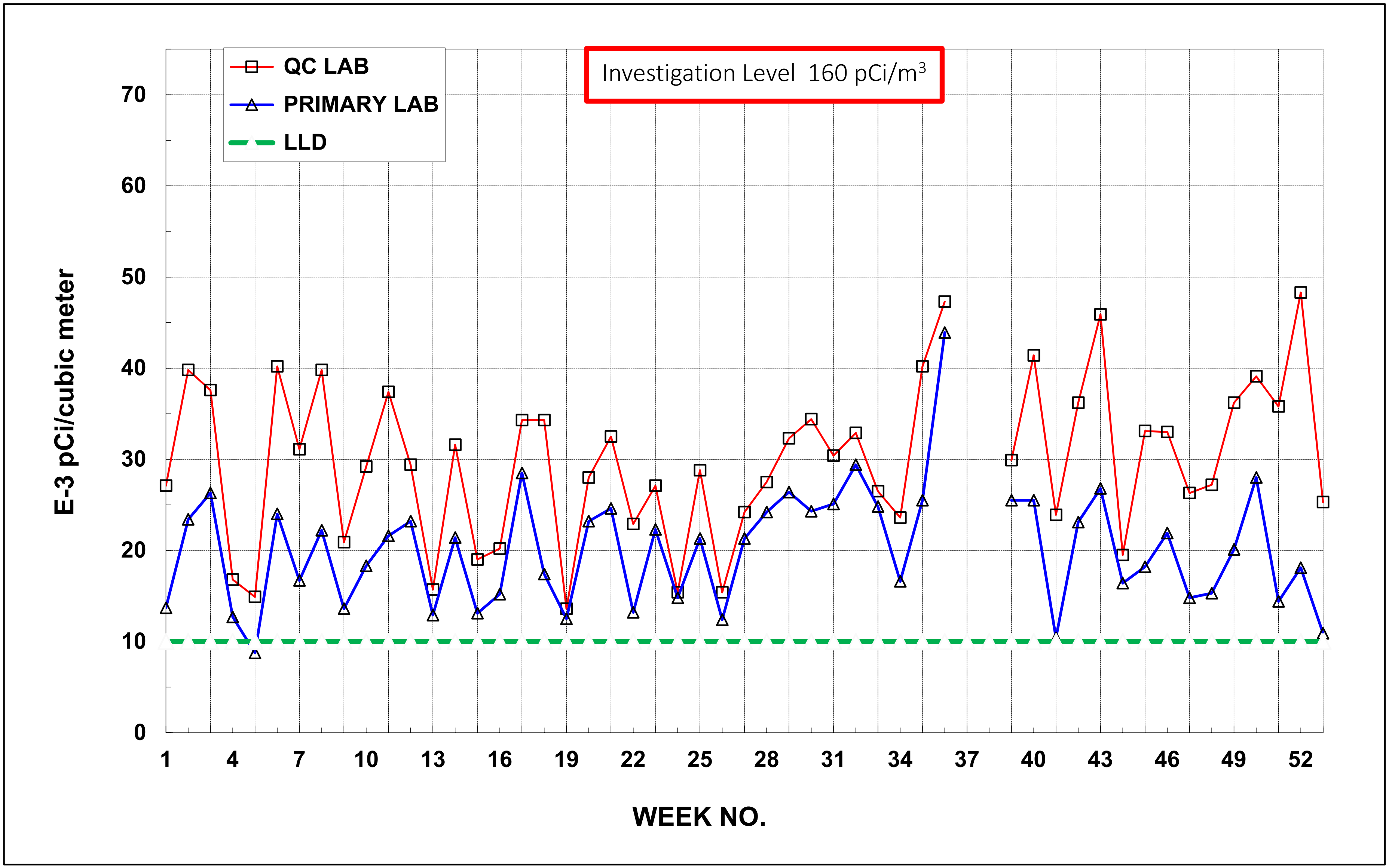


FIGURE D-2

COMPARISON OF WEEKLY GROSS BETA CONCENTRATIONS FROM CO-LOCATED AIR PARTICULATE LOCATIONS (1Z/1A) ANALYZED BY THE PRIMARY AND QC LABORATORIES, 2021



APPENDIX E

ERRATA DATA

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There was no errata data for 2021.

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APPENDIX F

INTER-LABORATORY COMPARISON PROGRAM ACCEPTANCE CRITERIA AND RESULTS

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A. Pre-set Acceptance Criteria

1. Analytics Evaluation Criteria

   Analytics' evaluation report provides a ratio of laboratory results and Analytics' known value. Since flag values are not assigned by Analytics, TBE-ES evaluates the reported ratios based on internal QC requirements, which are based on the DOE MAPEP criteria.

2. ERA Evaluation Criteria

   The Environmental Resource Associates' evaluation report provides an acceptance range for control and warning limits with associated flag values. The Environmental Resource Associates' acceptance limits are established per the United States Environmental Protection Agency (USEPA), National Environmental Laboratory Accreditation Conference (NELAC), state-specific performance testing program requirements or ERA's standard operating procedure for the Generation of Performance Acceptance Limits, as applicable. The acceptance limits are either determined by a regression equation specific to each analyte or a fixed percentage limit promulgated under the appropriate regulatory document.

3. DOE Evaluation Criteria

   MAPEP's evaluation report provides an acceptance range with associated flag values. The MAPEP defines three levels of performance:

   - Acceptable (flag = "A") - result within ± 20% of the reference value
   - Acceptable with Warning (flag = "W") - result falls in the ± 20% to ± 30% of the reference value
   - Not Acceptable (flag = "N") - bias is greater than 30% of the reference value

   Note: The Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP) samples are created to mimic conditions found at DOE sites which do not resemble typical environmental samples obtained at commercial nuclear power facilities.

4. Laboratory-Specific Criteria

   Each analytical laboratory has a documentation system in place to address performance evaluation (PE) sample failures in the form of corrective actions.

   - The TBE Laboratory initiates a Non-Conformance Report (NCR), which details the failure, performs a root cause investigation, and proposes a corrective and/or preventative action.
   - The EIS Laboratory enters failures into the Corrective Action Program for tracking and to prevent future occurrence.
   - The GEL Laboratory's system is documented via a Corrective Action Request and Report (CARR).

B. TBE PE Results and Discussion

1. The ERA MRAD March 2021 Water Fe-55 result was evaluated as Not Acceptable. The reported value for Fe-55 was 579 pCi/L and the known result was 275 pCi/L (acceptance range 162 - 400). When reviewing the original sample data, it was found that the carrier yield was 52.6% (lower than typical water samples). Looking at the etched plate that was counted, it appeared that some loss of sample could have occurred. The sample was logged for reanalysis and used as the workgroup duplicate. The results were acceptable at 197 and 221 respectively. Yields were 97.4% and 105.7% and the plated samples were centered with no apparent loss of sample. The loss of sample during plating resulted in a low yield which produced an artificially high sample result. (NCR 21-01)

2. The MAPEP February 2021 AP Gross Alpha result was evaluated as Not Acceptable. The reported value was 0.371 Bq/sample and the known result was 1.77 Bq/sample (acceptance range 0.53 - 3.01). A similar failure had occurred several years prior due to the filter being placed with the wrong side up on the detector. At that time, a small dot was placed on the top of the filter prior to removal from the package to indicate the correct side for counting. The current sample was still in the detector when the result was received (dot side facing the detector). The sample was recounted with a similar result and was flipped and recounted. The flipped result was 0.661 Bq/sample, within the acceptable range. Because TBE cannot rely on receiving correct packaging from the provider, MAPEP AP cross-checks will be counted on both sides going forward. *NOTE: The August sample had the same packaging issue (upside down).* (NCR 21-02)

3. The MAPEP February 2021 soil Ni-63 was evaluated as Not Acceptable. The reported value was 310 Bq/kg and the known result was 689 (acceptance range 482 - 896). All workgroup QC was reviewed with no anomalies. The analytical procedure had been revised prior to this analysis to eliminate added interferences. The sample yield was >100%, indicative of incomplete separation from interferences, leading to a lower result. The procedure was again revised after acceptable results were obtained. (NCR 21-03)

4. The ERA October 2021 water Gross Beta result was evaluated as Not Acceptable. The reported value was 63.0 pCi/L and the known was 55.7 (acceptance range 38.1 - 62.6) or 113% of the known. The 2-sigma error was 6.8, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. A follow-up Quick Response cross-check was analyzed with a 120% ratio (see item 7). (NCR 21-10)

5. The ERA October 2021 water Tritium result was evaluated as Not Acceptable. The reported value was 13,800 pCi/L and the known was 17,200 (acceptance range 15,000 - 18,900). The 2-sigma error was 1,430, placing the result within the acceptable range. TBE's internal QC acceptance is 70% - 130%, while ERA's for this sample was 87% - 110%. All QA was reviewed with no

anomalies. A Quick Response follow-up cross-check was analyzed with a result of 17,500 pCi/L (known 17,800 pCi/L). (NCR 21-11)

6. The MAPEP August 2021 soil Ni-63 result was evaluated as Not Acceptable. The reported value was 546 Bq/kg and the known result was 1,280 Bq/kg (acceptance range 896 - 1,664). All QC was reviewed and no anomalies found. The procedure revision to remove added MAPAP interferences was ineffective for this sample. No client soil matrix samples were analyzed for Ni-63 in 2020 or 2021. The root cause investigation is still ongoing at this time. (NCR 21-13)

7. The ERA December 2021 Quick Response water Gross Beta result was evaluated as Not Acceptable. The reported value was 47.6 pCi/L and the known was 39.8 pCi/L or 120% of the known (acceptance range of 26.4 - 47.3). The 2-sigma error was 6.1, placing the reported result well within the acceptable range. All QA was reviewed with no anomalies. The original sample was recounted on a different detector with a result of 40.3 ± 6.27 pCi/L. The "failure" of this sample and the RAD-127 was due to the narrow upper acceptance ranges assigned (119% and 112%) (NCR 21-14)

C. EIS Laboratory PE Results and Discussion

There were no failures for analyses performed for Peach Bottom Atomic Power Station in 2021.

D. GEL Labs PE Results and Discussion

There were no failures for analyses performed for Peach Bottom Atomic Power Station in 2021.

Table F.1

Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [(a)]	Ratio of TBE to Analytics Result	Evaluation [(b)]
March 2021	E13466	Milk	Sr-89	pCi/L	84.6	87.1	0.97	A
			Sr-90	pCi/L	11.5	12.6	0.91	A
	E13467	Milk	Ce-141	pCi/L	111	125	0.89	A
			Co-58	pCi/L	123	128	0.96	A
			Co-60	pCi/L	140	154	0.91	A
			Cr-51	pCi/L	252	242	1.04	A
			Cs-134	pCi/L	130	151	0.86	A
			Cs-137	pCi/L	110	110	1.00	A
			Fe-59	pCi/L	105	109	0.96	A
			I-131	pCi/L	77.6	86.9	0.89	A
			Mn-54	pCi/L	111	112	0.99	A
			Zn-65	pCi/L	200	211	0.95	A
	E13468	Charcoal	I-131	pCi	83.5	88.5	0.94	A
	E13469	AP	Ce-141	pCi	103.0	103	1.00	A
			Co-58	pCi	93.3	105	0.89	A
			Co-60	pCi	136	126	1.08	A
			Cr-51	pCi	213	198	1.07	A
			Cs-134	pCi	123.0	124	0.99	A
			Cs-137	pCi	86.3	90.1	0.96	A
			Fe-59	pCi	81.3	89.6	0.91	A
			Mn-54	pCi	93.5	92.0	1.02	A
			Zn-65	pCi	166	173	0.96	A
	E13470	Soil	Ce-141	pCi/g	0.232	0.262	0.89	A
			Co-58	pCi/g	0.251	0.268	0.94	A
			Co-60	pCi/g	0.306	0.322	0.95	A
			Cr-51	pCi/g	0.517	0.506	1.02	A
			Cs-134	pCi/g	0.263	0.317	0.83	A
			Cs-137	pCi/g	0.278	0.301	0.92	A
			Fe-59	pCi/g	0.228	0.229	1.00	A
			Mn-54	pCi/g	0.221	0.235	0.94	A
			Zn-65	pCi/g	0.448	0.441	1.02	A
	E13471	AP	Sr-89	pCi	92.2	95.5	0.97	A
			Sr-90	pCi	11.7	13.9	0.84	A

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

Table F.1

Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [(a)]	Ratio of TBE to Analytics Result	Evaluation [(b)]
September 2021	E13472	Milk	Sr-89	pCi/L	66.4	85.4	0.78	W
			Sr-90	pCi/L	11.9	14.0	0.85	A
	E13473	Milk	Ce-141	pCi/L	118	114	1.03	A
			Co-58	pCi/L	116	118	0.98	A
			Co-60	pCi/L	142	145	0.98	A
			Cr-51	pCi/L	244	236	1.03	A
			Cs-134	pCi/L	81	93.1	0.87	A
			Cs-137	pCi/L	105	112	0.94	A
			Fe-59	pCi/L	105	102	1.03	A
			I-131	pCi/L	65.1	85.6	0.76	W
			Mn-54	pCi/L	128	128	1.00	A
			Zn-65	pCi/L	158	153	1.03	A
	E13474	Charcoal	I-131	pCi	85.2	90.9	0.94	A
	E13475	AP	Ce-141	pCi	126	135	0.94	A
			Co-58	pCi	148	139	1.07	A
			Co-60	pCi	183	171	1.07	A
			Cr-51	pCi	322	278	1.16	A
			Cs-134	pCi	118	110	1.08	A
			Cs-137	pCi	147	132	1.12	A
			Fe-59	pCi	131	120	1.09	A
			Mn-54	pCi	161	151	1.06	A
			Zn-65	pCi	202	180	1.12	A
	E13476	Soil	Ce-141	pCi/g	0.215	0.219	0.98	A
			Co-58	pCi/g	0.208	0.226	0.92	A
			Co-60	pCi/g	0.277	0.277	1.00	A
			Cr-51	pCi/g	0.388	0.452	0.86	A
			Cs-134	pCi/g	0.157	0.178	0.88	A
			Cs-137	pCi/g	0.270	0.284	0.95	A
			Fe-59	pCi/g	0.218	0.195	1.12	A
			Mn-54	pCi/g	0.239	0.246	0.97	A
			Zn-65	pCi/g	0.312	0.293	1.06	A
	E13477	AP	Sr-89	pCi	85.6	68.3	1.25	W
			Sr-90	pCi	12.6	11.2	1.13	A

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on TBE internal QC limits:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

Table F.2

DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Acceptance Range	Evaluation (b)
February 2021	21-GrF44	AP	Gross Alpha	Bq/sample	0.371	1.77	0.53 - 3.01	N(3)
			Gross Beta	Bq/sample	0.731	0.65	0.325 - 0.974	A
	21-MaS44	Soil	Ni-63	Bq/kg	310	689.0	482 - 896	N(4)
			Tc-99	Bq/kg	457	638	447 - 829	W
	21-MaSU44	Urine	Cs-134	Bq/L	2.34	2.73	1.91 - 3.55	A
			Cs-137	Bq/L	2.54	2.71	1.90 - 3.52	A
			Co-57	Bq/L	0.4100		*(1)*	A
			Co-60	Bq/L	2.24	2.44	1.71 - 3.17	A
			Mn-54	Bq/L	2.03	2.03	1.42 - 2.64	A
			K-40	Bq/L	52.8	54.0	38 - 70	A
			U-234	Bq/L	0.108	0.0877	0.0614 - 0.114	W
			U-238	Bq/L	0.101	0.091	0.064 - 0.118	A
			Zn-65	Bq/L	1.06	1.34	*(2)*	A
	21-MaW44	Water	Ni-63	Bq/L	6.7	8.2	5.7 - 10.7	A
			Tc-99	Bq/L	3.850	4.01	2.81 - 5.21	A
	21-RdV44	Vegetation	Cs-134	Bq/sample	3.13	3.60	2.5 - 4.7	A
			Cs-137	Bq/sample	4.64	4.69	3.28 - 6.10	A
			Co-57	Bq/sample	5.25	5.05	3.54 - 6.57	A
			Co-60	Bq/sample	2.86	2.99	2.09 - 3.89	A
			Mn-54	Bq/sample	5.02	5.25	3.68 - 6.83	A
			Sr-90	Bq/sample	0.631	0.673	0.471 - 0.875	A
			Zn-65	Bq/sample	-0.233		*(1)*	A
August 2021	21-GrF45	AP	Gross Alpha	Bq/sample	0.368	0.960	0.288 - 1.632	A
			Gross Beta	Bq/sample	0.595	0.553	0.277 - 0.830	A
	21-MaS45	Soil	Ni-63	Bq/kg	546	1280	896 - 1664	N(5)
			Tc-99	Bq/kg	453	777	544 - 1010	N(6)
	21-MaSU45	Urine	Cs-134	Bq/L	3.10	3.62	2.53 - 4.71	A
			Cs-137	Bq/L	0.083		*(1)*	A
			Co-57	Bq/L	0.844	0.87	0.606 - 1.125	A
			Co-60	Bq/L	0.0535		*(1)*	A
			Mn-54	Bq/L	0.459	0.417	*(2)*	A
			K-40	Bq/L	48.8	54.0	38 - 70	A
			U-234	Bq/L	0.133	0.116	0.081 - 0.151	A
			U-238	Bq/L	0.137	0.121	0.085 - 0.157	A
			Zn-65	Bq/L	0.339	0.420	*(2)*	A
	21-MaW45	Water	Ni-63	Bq/L	33.5	39.5	27.7 - 51.4	A
			Tc-99	Bq/L	3.5	3.7	2.60 - 4.82	A
	21-RdV45	Vegetation	Cs-134	Bq/sample	3.42	4.34	3.04 - 5.64	W
			Cs-137	Bq/sample	2.14	2.21	1.55 - 2.87	A
			Co-57	Bq/sample	4.08	4.66	3.26 - 6.06	A
			Co-60	Bq/sample	2.81	3.51	2.46 - 4.56	A
			Mn-54	Bq/sample	0.035		*(1)*	A
			Sr-90	Bq/sample	1.15	1.320	0.92 - 1.72	A
			Zn-65	Bq/sample	2.05	2.43	1.70 - 3.16	A

(a) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) DOE/MAPEP evaluation:
A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test
(2) Sensitivity evaluation
(3) See ***NCR 21-02***
(4) See ***NCR 21-03***
(5) See ***NCR 21-13***
(6) Tc-99 cross-checks done for TBE information only - not required

Table F.3

ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [(a)]	Acceptance Limits	Evaluation [(b)]
March 2021	MRAD-34	Water	Am-241	pCi/L	175	157	108 - 201	A
			Fe-55	pCi/L	579	275	162 - 400	N[(1)]
			Pu-238	pCi/L	181	171	103 - 222	A
			Pu-239	pCi/L	153	142	87.9 - 175	A
		Soil	Sr-90	pCi/kg	6570	9190	2860 - 14,300	A
		AP	Fe-55	pCi/filter	107	121	44.2 - 193	A
			U-234	pCi/filter	25.99	25.5	18.9 - 29.9	A
			U-238	pCi/filter	24.7	25.3	19.1 - 30.2	A
April 2021	RAD-125	Water	Ba-133	pCi/L	92.3	90.5	76.2 - 99.6	A
			Cs-134	pCi/L	62.9	70.5	57.5 - 77.6	A
			Cs-137	pCi/L	161	168	151 - 187	A
			Co-60	pCi/L	22.5	20.9	17.7 - 25.8	A
			Zn-65	pCi/L	183	177.0	159 - 208	A
			GR-A	pCi/L	30.8	30.2	15.4 - 39.4	A
			GR-B	pCi/L	60.1	67.5	46.8 - 74.2	A
			U-Nat	pCi/L	36.45	36.9	30.0 - 40.8	A
			H-3	pCi/L	13,400	14,600	12,800 - 16,100	A
			Sr-89	pCi/L	64.5	63.5	51.4 - 71.5	A
			Sr-90	pCi/L	22.8	23.0	16.5 - 27.0	A
			I-131	pCi/L	28.2	26.7	22.2 - 31.4	A
September 2021	MRAD-35	Water	Am-241	pCi/L	68	63.7	43.7 - 81.5	A
			Fe-55	pCi/L	179	246	145 - 358	A
			Pu-238	pCi/L	102	114	68.5 - 148	A
			Pu-239	pCi/L	32	34.3	21.2 - 42.3	A
		Soil	Sr-90	pCi/kg	6160	6090	1,900 - 9,490	A
		AP	Fe-55	pCi/filter	493	548	200 - 874	A
			Pu-238	pCi/filter	28	28.5	21.5 - 35.0	A
			Pu-239	pCi/filter	21	21.6	16.1 - 26.1	A
			U-234	pCi/filter	7.95	7.76	5.75 - 9.09	A
			U-238	pCi/filter	8.0	7.69	5.81 - 9.17	A
October 2021	RAD-127	Water	Ba-133	pCi/L	82.8	87.5	73.6 - 96.2	A
			Cs-134	pCi/L	64.0	70.1	57.1 - 77.1	A
			Cs-137	pCi/L	145	156	140 - 174	A
			Co-60	pCi/L	83.2	85.9	77.3 - 96.8	A
			Zn-65	pCi/L	133	145	130 - 171	A
			GR-A	pCi/L	76.0	66.7	35.0 - 82.5	A
			GR-B	pCi/L	63.0	55.7	38.1 - 62.6	N[(2)]
			U-Nat	pCi/L	52.88	55.5	45.3 - 61.1	A
			H-3	pCi/L	13,800	17,200	15,000 - 18,900	N[(3)]
			Sr-89	pCi/L	54.9	61.0	49.1 - 68.9	A
			Sr-90	pCi/L	24.8	29.3	21.3 - 34.0	A
			I-131	pCi/L	27.4	26.4	21.9 - 31.1	A
December 2021	QR 120121Y	Water	GR-B	pCi/L	47.6	39.8	26.4 - 47.3	N[(4)]
			H-3	pCi/L	17,500	17,800	15,600 - 19,600	A

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation:
A = Acceptable - Reported value falls within the Acceptance Limits
N = Not Acceptable - Reported value falls outside of the Acceptance Limits

(1) See ***NCR 21-01***
(2) See ***NCR 21-10***
(3) See ***NCR 21-11***
(4) See ***NCR 21-14***

TABLE F.4 Analytics Environmental Radioactivity Cross Check Program
Exelon Industrial Services (2021)

Month/Year	Identification Number	Matrix	Nuclide	Units	EIS Reported Value	Known Value (a)	Ratio of Analytics to EIS Result	Evaluation (b)
March 2021	E13390	Milk	I-131	pCi/L	105	86.9	121	Pass
	Detector 4		Ce-141	pCi/L	122	125	98.0	Pass
			Co-58	pCi/L	126	128	98.7	Pass
			Co-60	pCi/L	155	154	100	Pass
			Cr-51	pCi/L	257	242	106	Pass
			Cs-134	pCi/L	145	151	96.3	Pass
			Cs-137	pCi/L	116	110	106	Pass
			Fe-59	pCi/L	116	109	107	Pass
			Mn-54	pCi/L	122	112	109	Pass
			Zn-65	pCi/L	195	211	92.6	Pass
	E13390	Milk	I-131	pCi/L	89.0	86.9	102	Pass
	Detector 5		Ce-141	pCi/L	127	125	102	Pass
			Co-58	pCi/L	118	128	92.0	Pass
			Co-60	pCi/L	147	154	95.3	Pass
			Cr-51	pCi/L	302	242	125	Pass
			Cs-134	pCi/L	134	151	88.5	Pass
			Cs-137	pCi/L	111	110	101	Pass
			Fe-59	pCi/L	121	109	111	Pass
			Mn-54	pCi/L	118	112	105	Pass
			Zn-65	pCi/L	190	211	90.0	Pass
	E13391 S5E	Water	Gr-B	pCi/L	250	283	88.3	Pass
	E13392 Detector 4	Charcoal	I-131	pCi	79.7	88.2	90.4	Pass
	E13392 Detector 5	Charcoal	I-131	pCi	79.5	88.2	90.1	Pass
June 2021	E13395	AP	Ce-141	pCi	146	132	110	Pass
	Detector 4		Co-58	pCi	133	131	102	Pass
			Co-60	pCi	171	158	108	Pass
			Cr-51	pCi	416	390	107	Pass
			Cs-134	pCi	136	156	87.0	Pass
			Cs-137	pCi	138	138	99.8	Pass
			Fe-59	pCi	161	134	120	Pass
			Mn-54	pCi	204	183	111	Pass
			Zn-65	pCi	255	220	116	Fail[1]
	E13395	AP	Ce-141	pCi	141	132	107	Pass
	Detector 5		Co-58	pCi	136	131	104	Pass
			Co-60	pCi	164	158	104	Pass
			Cr-51	pCi	426	390	109	Pass
			Cs-134	pCi	138	156	88.4	Pass
			Cs-137	pCi	142	138	103	Pass
			Fe-59	pCi	163	134	121	Pass
			Mn-54	pCi	208	183	114	Pass
			Zn-65	pCi	230	220	105	Fail[1]
	E13396	AP	Gr-B	pCi	166	143	116	Pass
	S5E		Gr-B	pCi	163	143	114	Pass

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on EIS internal QC limits in accordance with the NRC Resolution Test criteria

TABLE F.4 Analytics Environmental Radioactivity Cross Check Program Exelon Industrial Services (2021)

Month/Year	Identification Number	Matrix	Nuclide	Units	EIS Reported Value	Known Value (a)	Ratio of Analytics to EIS Result	Evaluation (b)
	E13394 Detector 3	Water	I-131	pCi/L	103	92.0	112	Pass
			Ce-141	pCi/L	161	180	89.4	Pass
			Co-58	pCi/L	176	179	98.5	Pass
			Co-60	pCi/L	222	215	103	Pass
			Cr-51	pCi/L	506	533	95.0	Pass
			Cs-134	pCi/L	198	213	92.9	Pass
			Cs-137	pCi/L	193	188	103	Pass
			Fe-59	pCi/L	202	183	110	Pass
			Mn-54	pCi/L	250	249	100	Pass
			Zn-65	pCi/L	304	300	101	Pass
	E13394 Detector 4	Water	I-131	pCi/L	94.3	92.0	103	Pass
			Ce-141	pCi/L	176	180	97.6	Pass
			Co-58	pCi/L	173	179	96.5	Pass
			Co-60	pCi/L	216	215	100	Pass
			Cr-51	pCi/L	514	533	96.4	Pass
			Cs-134	pCi/L	195	213	91.5	Pass
			Cs-137	pCi/L	193	188	103	Pass
			Fe-59	pCi/L	181	183	98.7	Pass
			Mn-54	pCi/L	236	249	94.9	Pass
			Zn-65	pCi/L	298	300	99.3	Pass
	E13394 Detector 5	Water	I-131	pCi/L	91.2	92.0	99.1	Pass
			Ce-141	pCi/L	201	180	112	Pass
			Co-58	pCi/L	168	179	93.9	Pass
			Co-60	pCi/L	226	215	105	Pass
			Cr-51	pCi/L	521	533	97.7	Pass
			Cs-134	pCi/L	193	213	90.6	Pass
			Cs-137	pCi/L	187	188	99.5	Pass
			Fe-59	pCi/L	199	183	109	Pass
			Mn-54	pCi/L	247	249	99.2	Pass
			Zn-65	pCi/L	275	300	91.7	Pass
	E13393 S5E	Water	Gr-B	pCi/L	225	250	90	Pass
September 2021	E13397 S5E	AP	Gr-B	pCi	220	217	101	Pass
			Gr-B	pCi	211	217	97	Pass
December 2021	E13398 Detector 4	AP	Ce-141	pCi	91.5	99.7	91.8	Pass
			Co-58	pCi	79.1	86.6	91.3	Pass
			Co-60	pCi	167	169	98.5	Pass
			Cr-51	pCi	190	222	85.4	Pass
			Cs-134	pCi	97.7	126	77.5	Pass
			Cs-137	pCi	79.2	88.7	89.3	Pass
			Fe-59	pCi	85.3	85.3	100	Pass
			Mn-54	pCi	110	115	95.5	Pass
			Zn-65	pCi	180	195	92.5	Fail(1)

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on EIS internal QC limits in accordance with the NRC Resolution Test criteria

TABLE F.4 **Analytics Environmental Radioactivity Cross Check Program**
Exelon Industrial Services (2021)

Month/Year	Identification Number	Matrix	Nuclide	Units	EIS Reported Value	Known Value [a]	Ratio of Analytics to EIS Result	Evaluation [b]
December 2021	E13398	AP	Ce-141	pCi	94.9	99.7	95.2	Pass
	Detector 5		Co-58	pCi	79.7	86.6	92.0	Pass
			Co-60	pCi	154	169	91.2	Pass
			Cr-51	pCi	212	222	95.3	Pass
			Cs-134	pCi	94.7	126	75.1	Pass
			Cs-137	pCi	76.4	88.7	86.2	Pass
			Fe-59	pCi	92.6	85.3	109	Pass
			Mn-54	pCi	110	115	95.8	Pass
			Zn-65	pCi	182	195	93.1	Fail [1]
	E13399	Water	Gr-B	pCi/L	287	281	102	Pass
	S5E							
	E13400	Charcoal	I-131	pCi	91.7	94.3	97.2	Pass
	Detector 3							
	E13400	Charcoal	I-131	pCi	89.1	94.3	94.5	Pass
	Detector 4							
	E13400	Charcoal	I-131	pCi	88.9	94.3	94.3	Pass
	Detector 5							
	E13401	Milk	I-131	pCi/L	84.3	90.3	93.4	Pass
	Detector 3		Ce-141	pCi/L	131	132	98.9	Pass
			Co-58	pCi/L	104	114	91.2	Pass
			Co-60	pCi/L	224	223	101	Pass
			Cr-51	pCi/L	285	293	97.3	Pass
			Cs-134	pCi/L	160	166	96.4	Pass
			Cs-137	pCi/L	114	117	97.5	Pass
			Fe-59	pCi/L	125	113	111	Pass
			Mn-54	pCi/L	156	152	102	Pass
			Zn-65	pCi/L	253	257	98.4	Pass
	E13401	Milk	I-131	pCi/L	94.8	90.3	105	Pass
	Detector 4		Ce-141	pCi/L	115	132	87.3	Pass
			Co-58	pCi/L	106	114	93.3	Pass
			Co-60	pCi/L	232	223	104	Pass
			Cr-51	pCi/L	265	293	90.6	Pass
			Cs-134	pCi/L	161	166	96.9	Pass
			Cs-137	pCi/L	116	117	99.3	Pass
			Fe-59	pCi/L	119	113	105	Pass
			Mn-54	pCi/L	164	152	108	Pass
			Zn-65	pCi/L	261	257	102	Pass

(a) The Analytics known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) Analytics evaluation based on EIS internal QC limits in accordance with the NRC Resolution Test criteria

TABLE F.5 **ERA Environmental Radioactivity Cross Check Program**
Exelon Industrial Services (2021)

Month/Year	ID Number	Matrix	Nuclide	Units	EIS Reported Value	Known Value [(a)]	Acceptance Ratio of ERA to EIS Result	Evaluation [(b)]
April 2021	RAD-125	Water	Ba-133	pCi/L	86.1	90.5	95.1	Pass
	Detector 3		Cs-134	pCi/L	69.0	70.5	97.9	Pass
			Cs-137	pCi/L	163	168	97.0	Pass
			Co-60	pCi/L	22.3	20.9	107	Pass
			Zn-65	pCi/L	171.5	177	97	Pass
			I-131	pCi/L	28.7	26.7	107	Pass
	S5E		GR-B	pCi/L	58.1	67.5	86.0	Pass
September 2021	MRAD-35	AP	Cs-134	pCi	218	241	90.5	Pass
	Detector 4		Cs-137	pCi	210	187	112	Pass
			Co-60	pCi	356	310	115	Pass
			Zn-65	pCi	411	366	112	Pass
October 2021	RAD-127	Water	Ba-133	pCi/L	83.9	87.5	95.9	Pass
	Detector 5		Cs-134	pCi/L	66.8	70.1	95.3	Pass
			Cs-137	pCi/L	152	156	97.4	Pass
			Co-60	pCi/L	83.4	85.9	97.1	Pass
			Zn-65	pCi/L	142	145	97.9	Pass
	Detector 3		I-131	pCi/L	29.9	26.4	113	Pass

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation based on EIS internal QC limits in accordance with the NRC Resolution Test criteria

(2) Passed vendor acceptance criteria, but failed NRC Resolution Test criteria

TABLE F.6 **DOE's Mixed Analyte Performance Evaluation Program (MAPEP)**

GEL Laboratories

Quarter/Year	Identification Number	Matrix	Nuclide	Units	Reported Value	Known Value [(a)]	Acceptance Range	Evaluation [(b)]
2nd/2021	21-MaW44	Water	H-3	Bq/L	2.27		False Positive Test	A
4th/2021	21-MaW45	Water	H-3	Bq/L	231	250	175 - 325	A

(a) The MAPEP known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation

(b) DOE/MAPEP evaluation:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20

W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30

N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

TABLE F.7 **ERA Environmental Radioactivity Cross Check Program**
GEL Laboratories

Quarter/Year	Identification Number	Matrix	Nuclide	Units	Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
1st/2021	RAD-124	Water	H-3	pCi/L	2,000	2,120	1,750 - 27,800	A
			H-3	pCi/L	2,020	2,120	1,750 - 27,800	A
2nd/2021	MRAD-34	Water	H-3	pCi/L	24,900	22,800	17,200 - 27,800	A
3rd/2021	RAD-126	Water	H-3	pCi/L	9,820	10,400	9,050 - 11,400	A
			H-3	pCi/L	10,300	10,400	9,050 - 11,400	A
4th/2021	MRAD-35	Water	H-3	pCi/L	12,600	12,800	9,650 - 15,600	A

(a) The ERA known value is equal to 100% of the parameter present in the standard as determined by gravimetric and/or volumetric measurements made during standard preparation.

(b) ERA evaluation: A = Acceptable - Reported value falls within the Acceptance Limits
N = Not Acceptable - Reported value falls outside of the Acceptance Limits

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APPENDIX G

ANNUAL RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM REPORT (ARGPPR)

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Docket No: 50-277
50-278

PEACH BOTTOM ATOMIC POWER STATION
UNITS 2 and 3

Annual Radiological Groundwater
Protection Program Report (ARGPPR)

January 1 through December 31, 2021

Prepared By
Teledyne Brown Engineering
Environmental Services

Constellation

Peach Bottom Atomic Power Station
Delta, PA 17314

May 2022

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Appendices

I. Summary and Conclusions

This report on the Radiological Groundwater Protection Program (RGPP) conducted for the Peach Bottom Atomic Power Station (PBAPS) by Constellation Nuclear covers the period 01 January 2021 through 31 December 2021. This evaluation involved numerous station personnel and contractor support personnel. At PBAPS, there are 31 permanent groundwater monitoring wells. Installation of the wells began in 2006. Of these monitoring locations, none are assigned to the station's Radiological Environmental Monitoring Program (REMP). This report covers groundwater, surface water, seep water, and precipitation water samples collected from the environment on station property in 2021. During that time period, 317 analyses were performed on 248 samples from 36 locations. These 36 locations include 21 groundwater monitoring wells, 2 surface water sample points, 3 groundwater seeps, 2 yard drain sumps, and 8 precipitation water sampling points. Phase 1 of the monitoring was part of a comprehensive study initiated by Constellation to determine whether groundwater or surface water in the vicinity of PBAPS had been adversely impacted by any releases of radionuclides. Phase 1 was conducted by Conestoga Rovers and Associates (CRA) and the conclusions were made available to state and federal regulators as well as the public. Phase 2 of the RGPP was conducted by Constellation corporate and station personnel to initiate follow up of Phase 1 and begin long-term monitoring at groundwater and surface water locations selected during Phase 1. All analytical results from Phase 2 monitoring are reported herein.

Samples supporting the RGPP were analyzed for tritium (H-3), strontium-89 (Sr-89), strontium-90 (Sr-90), gamma-emitting radionuclides associated with licensed plant operations and isotopes known as 'hard to detects'.

In assessing all the data gathered for this report, it was concluded that the operation of PBAPS had no adverse radiological impact on the environment and there are currently no known active releases into the groundwater at PBAPS.

Tritium was not detected in any groundwater sample greater than the United States Environmental Protection Agency (USEPA) drinking water standard (and the Nuclear Regulatory Commission [NRC] Reporting Limit) of 20,000 pCi/L.

Tritium was not detected at concentrations greater than the minimum detectable concentration (MDC) in any surface water or seep water sample locations. Based on the sample data, tritium is not migrating off the station property at detectable concentrations. Tritium was detected in 3 precipitation water sample locations but below the 20,000 pCi/L limit.

II. Introduction

PBAPS is located along the Susquehanna River between Holtwood and Conowingo Dams in Peach Bottom Township, York County, Pennsylvania. The initial loading of fuel into Unit 1, a 40 MWe (net) high temperature gas-cooled reactor, began on 5 February 1966, and initial criticality was achieved on 3 March 1966. Shutdown of Peach Bottom Unit 1 for decommissioning was on 31 October 1974. For the purposes of the monitoring program, the beginning of the operational period for Unit 1 was considered to be 5 February 1966. A summary of the Unit 1 preoperational monitoring program was presented in a previous report [(1)]. PBAPS Units 2 and 3 are boiling water reactors, each with a power output of approximately 1385 MWe. The first fuel was loaded into Peach Bottom Unit 2 on 9 August 1973. Criticality was achieved on 16 September 1973 and full power was reached on 16 June 1974. The first fuel was loaded into Peach Bottom Unit 3 on 5 July 1974. Criticality was achieved on 7 August 1974 and full power was first reached on 21 December 1974. Preoperational summary reports [(2)(3)] for Units 2 and 3 have been previously issued and summarize the results of all analyses performed on samples collected from 5 February 1966 through 8 August 1973.

This report covers those analyses performed by Teledyne Brown Engineering (TBE) and GEL Laboratories (GEL) on samples collected in 2021.

A. Objective of the RGPP

The objectives of the RGPP are as follows:

1. Ensure that the site characterization of geology and hydrology provides an understanding of predominant groundwater gradients based upon current site conditions.
2. Identify site risk based on plant design and work practices.
3. Establish an on-site groundwater monitoring program to ensure timely detection of inadvertent radiological releases to ground water.
4. Establish a remediation protocol to prevent migration of licensed material off-site and to minimize decommissioning impacts.
5. Ensure that records of leaks, spills, remediation efforts are retained and retrievable to meet the requirements of 10 CFR 50.75(g).
6. Conduct initial and periodic briefings of their site specific Groundwater Protection Initiative (GPI) program with the designated State/Local officials.
7. Make informal communication as soon as practicable to appropriate State/Local officials, with follow-up notifications to the NRC, as appropriate, regarding significant on-site leaks/spills into groundwater and on-site or off-site water sample results exceeding the criteria in the REMP as described in the Offsite Dose Calculation Manual (ODCM).

8. Submit a written 30-day report to the NRC for any water sample result for on-site groundwater that is or may be used as a source of drinking water that exceeds any of the criteria in the licensee's existing REMP/ODCM for 30-day reporting of off-site water sample results.
9. Document all on-site groundwater sample results and a description of any significant on-site leaks/spills into groundwater for each calendar year in the Annual Radiological Environmental Operating Report (AREOR) for REMP or the Annual Radioactive Effluent Release Report (ARERR).
10. Perform a self-assessment of the GPI program.
11. Conduct a review of the GPI program, including at a minimum the licensee's self-assessments, under the auspices of the Nuclear Energy Institute (NEI).

B. Implementation of the Objectives

The objectives identified have been implemented at PBAPS via Constellation Corporate and Site specific procedures. These procedures include:

1. EN-AA-407, Response to Inadvertent Releases of Licensed Materials to Groundwater, Surface Water, Soil or Engineered Structures
2. EN-AA-408, Radiological Groundwater Protection Program
3. EN-AA-408-4000, Radiological Groundwater Protection Program Implementation
4. EN-PB-408-4160, RGPP Reference Material for Peach Bottom Atomic Power Station

C. Program Description

1. Sample Collection

Sample locations can be found in Table A-1 and Figures A-1, A-2 and A-3, Appendix A.

<u>Groundwater, Surface Water and Precipitation Water</u>

Samples of water are collected, managed, transported and analyzed in accordance with approved procedures. Sample locations, sample collection frequencies and analytical frequencies are controlled in accordance with approved station procedures. Contractor and/or station personnel are trained in the collection, preservation management and shipment of samples, as well as in documentation of sampling events. Analytical laboratories are subject to internal quality assurance programs, industry cross-check programs, as well as nuclear industry audits. Station personnel review and evaluate all analytical data deliverables as data are received.

Analytical data results are reviewed by both station personnel and an independent hydro geologist for adverse trends or changes to hydrogeologic conditions.

D. Characteristics of Tritium

Tritium is a radioactive isotope of hydrogen. The most common form of tritium is tritium oxide, which is also called "tritiated water." The chemical properties of tritium are essentially those of ordinary hydrogen.

Tritiated water behaves the same as ordinary water in both the environment and the body. Tritium can be taken into the body by drinking water, breathing air, eating food or absorption through skin. Once tritium enters the body it disperses quickly and is uniformly distributed throughout the body. Tritium is excreted primarily through urine with a clearance rate characterized by an effective biological half-life of about 14 days. Within one month or so after ingestion essentially all tritium is cleared. Organically bound tritium (tritium that is incorporated in organic compounds) can remain in the body for a longer period.

Tritium is produced naturally in the upper atmosphere when cosmic rays strike air molecules. Tritium is also produced during nuclear weapons explosions, as a by-product in reactors producing electricity and in special production reactors, where the isotopes lithium-7 (Li-7) and/or boron-10 (B-10) are activated to produce tritium. Like normal water, tritiated water is colorless and odorless. Tritiated water behaves chemically and physically like non-tritiated water in the subsurface and therefore tritiated water will travel at the same velocity as the average groundwater velocity.

Tritium has a half-life of approximately 12.3 years. It decays spontaneously to helium-3 (He-3). This radioactive decay releases a beta particle (low-energy electron). The radioactive decay of tritium is the source of the health risk from exposure to tritium. Tritium emits a low energy beta particle and leaves the body relatively quickly. Since tritium is almost always found as water, it goes directly into soft tissues and organs. The associated dose to these tissues is generally uniform and is dependent on the water content of the specific tissue.

III. Program Description

A. Sample Analysis

This section describes the general analytical methodologies used by TBE and GEL Laboratories (GEL) to analyze the environmental samples for radioactivity for the PBAPS RGPP in 2021.

In order to achieve the stated objectives, the current program includes the following analyses:

1. Concentrations of gamma emitters in groundwater.
2. Concentrations of strontium in groundwater.
3. Concentrations of tritium in groundwater, surface water and precipitation water.
4. Concentrations of 'hard-to-detect' isotopes, americium-241 (Am-241), cerium-242/243/244 (Cm-242, Cm-243, Cm-244), plutonium-238/239/240 (Pu-238, Pu-239, Pu-240), uranium-233/234/235/238 (U-233, U-234, U-235, U-238), iron-55 (Fe-55), and nickel-63 (Ni-63) in groundwater. These analyses are required based on historical tritium results.

B. Data Interpretation

The radiological data collected prior to PBAPS becoming operational were used as a baseline for operational data comparison. For the purpose of this report, PBAPS was considered operational at initial criticality. Several factors were important in the interpretation of the data:

1. <u>Lower Limit of Detection</u>
   The lower limit of detection (LLD) is a minimum sensitivity value that must be achieved routinely by the analytical parameter.
2. <u>Laboratory Measurements Uncertainty</u>
   The estimated uncertainty in measurement of tritium in environmental samples is frequently on the order of 50% of the measurement value.

   Statistically, the exact value of a measurement is expressed as a range with a stated level of confidence. The convention is to report results with a 95% level of confidence. The uncertainty comes from factors such as calibration standards, sample volume or weight measurements, and sampling uncertainty. Constellation reports the uncertainty of a measurement created by statistical process (counting error) as well as all sources of error (Total Propagated Uncertainty or TPU). Each result has two values calculated. Constellation reports the TPU by following the result with plus or minus (±) the estimated sample standard deviation.

Analytical uncertainties are reported at the 95% confidence level in this report for reporting consistency with the AREOR.

Groundwater was analyzed using gamma spectroscopy for the following isotopes: Mn-54, Co-58, Co-60, Fe-59, Zn-65, Nb-95, Zr-95, I-131, Cs-134, Cs-137, Ba-140 and La-140.

C. Background Analysis

A pre-operational REMP was conducted to establish background radioactivity levels prior to operation of the Station. The environmental media sampled and analyzed during the pre-operational REMP were atmospheric radiation, fall-out, domestic water, surface water, marine life and foodstuffs. The results of the monitoring were detailed in References 2 and 3. The pre-operational REMP contained analytical results from samples collected from the surface water, discharge, well water and rainwater.

1. Background Concentrations of Tritium

The purpose of the following discussion is to summarize background measurements of tritium in various media performed by others. Additional detail may be found by consulting references (CRA 2006)[1].

a. Tritium Production

Tritium is created in the environment from naturally occurring processes both cosmic and subterranean, as well as from anthropogenic (i.e., man-made) sources. In the upper atmosphere, “Cosmogenic” tritium is produced from the bombardment of stable nuclides and combines with oxygen to form tritiated water, which will then enter the hydrologic cycle. Below ground, “lithogenic” tritium is produced by the bombardment of natural Li present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant U and Th. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of Li in rock. The lithogenic tritium is introduced directly to groundwater.

A major anthropogenic source of tritium and Sr-90 comes from the former atmospheric testing of thermonuclear weapons. Levels of tritium in precipitation increased significantly during the 1950s and early 1960s and later with additional testing, resulting in the release of significant amounts of tritium to the atmosphere. The Canadian heavy water nuclear power reactors, other commercial power reactors, nuclear research and weapons production continue to influence tritium concentrations in the environment.

b. Precipitation Data

Precipitation monitoring was done at PBAPS until 2006. These

types of samples are routinely collected at stations around the world for the analysis of tritium and other radionuclides. Two publicly available databases that provide tritium concentrations in precipitation are Global Network of Isotopes in Precipitation (GNIP) and USEPA's RadNet database. GNIP provides tritium precipitation concentration data for samples collected worldwide from 1960 to 2006. RadNet provides tritium precipitation concentration data for samples collected at stations throughout the U.S. from 1960 up to and including 2006. Based on GNIP data for sample stations located in the U.S. Midwest, tritium concentrations peaked around 1963. This peak, which approached 10,000 pCi/L for some stations, coincided with the atmospheric testing of thermonuclear weapons. Tritium concentrations in surface water showed a sharp decline until 1975. A gradual decline has followed since that time. Tritium concentrations have typically been below 100 pCi/L since around 1980. Tritium concentrations in wells may still be above the 200 pCi/L detection limit from the external causes described above. Water from previous years and decades is naturally captured in groundwater, so some well water sources today are affected by the surface water from the 1960s that was elevated in tritium.

c. Surface Water Data

Surface water level measurements were collected at the surface water monitoring locations during the groundwater level measurement event. The purpose of the surface water monitoring was to provide surface water elevation data to evaluate the groundwater/surface water interaction at the Station.

The USEPA RadNet surface water data typically has a reported 'Combined Standard Uncertainty' of 35 to 50 pCi/L. According to USEPA, this corresponds to a ± 70 to 100 pCi/L 95% confidence bound on each given measurement. Therefore, the typical background data provided may be subject to measurement uncertainty of approximately ± 70 to 100 pCi/L.

The radio-analytical laboratory is counting tritium results to an Constellation-specified LLD of 200 pCi/L. Typically, the lowest positive measurement will be reported within a range of 40 - 240 pCi/L or 140 ± 100 pCi/L. Clearly, these sample results cannot be distinguished as different from background at this concentration.

IV. Results and Discussion

A. Groundwater Results

Groundwater samples were collected from on-site wells throughout the year in accordance with the station RGPP. Analytical results and anomalies are discussed below:

Tritium

Samples from 26 locations were analyzed for tritium activity. These locations include 24 wells and the 2 yard drains sampled during the quarterly sampling events as part of the RGPP program. Tritium was not detected in wells at or near the owner-controlled boundary. The location most representative of potential offsite user of drinking water is less than the MDC.

Low levels of tritium were detected at concentrations greater than the minimum detectable concentration (MDC) in 12 of the 26 locations (24 groundwater monitoring wells and the 2 yard drain locations). The tritium concentrations ranged from the detection limit to 12,200 pCi/L. (Table B–I.1, Appendix B)

Strontium

Sr-89 and Sr-90 were not detected in any of the samples. (Table B-I.1, Appendix B)

Hard-To-Detect

Hard-To-Detect analyses were performed on one groundwater location. The analyses included Am-241, Cm-242, Cm-243/244, Pu-238, Pu-239/240, U-234, U-235, U-238, Fe-55 and Ni-63.

U-234 was detected in the one location at a concentration of 0.93 pCi/L. U-238 was detected in the one location at a concentration of 0.44 pCi/L. The activity detected is naturally occurring and the levels are considered to be background. All other Hard-To-Detect analyses were less than the MDC. (Table B–I.3, Appendix B)

Gamma Emitters

No power-production gamma emitters were detected in the sample. (Table B–I.2, Appendix B)

B. Surface Water Results

Surface Water samples were collected from two surface water locations throughout the year in accordance with the station RGPP. Analytical results are discussed below:

Tritium

Samples from two locations were analyzed for tritium activity. Tritium was not detected in any surface water locations greater than the MDC. (Table B–II.1, Appendix B)

C. Precipitation Water Results

Samples were collected at eight locations (PB-P1, PB-P2, PB-P3, PB-P4, PB-P5, PB-P6, PB-P7, and PB-P8) in accordance with the station RGPP. The following analysis was performed:

Tritium

Samples from eight locations were analyzed for tritium activity. Tritium activity was detected in three locations greater than the MDC. The concentrations ranged from 192 to 210 pCi/L. (Table B–III.1, Appendix B)

D. Drinking Water Well Survey

A drinking water well survey was conducted during the summer 2006 by CRA (CRA 2006)(1) around PBAPS. The water well inventory was updated in 2012(4). The updated water well database search indicated a new water well off Station property within a one mile radius of the Station. The well is described as a “test” well and its use is listed as “unused”. In summary, there were no significant changes in off Station groundwater use from 2006-2012.

E. Summary of Results – Inter-Laboratory Comparison Program

Inter-Laboratory Comparison Program results for TBE and GEL are presented in the AREOR.

F. Leaks, Spills and Releases

Based on analytical data collected in 2021, there does not appear to be an active source of tritium to groundwater.

G. Trends

A tritium plume has been identified northeast of the Unit 3 Turbine Building. The plume extends eastward toward well MW-PB-4. The plume is bounded on the north by wells MW-PB-12 and MW-PB-22. The plume is bounded on the south by wells MW-PB-20 and MW-PB-21.

The tritium plume is a result of licensed material entering the groundwater through degraded floor seams and penetration seals in the Unit 3 Turbine Building. The activity currently detected in the Unit 3 Turbine Building monitoring wells, MW-PB-24, 25, 26 and 27, is the result of legacy licensed material under the turbine building being transported eastward by natural hydrogeologic groundwater flow.

Tritium activity in the Unit 3 Turbine Building monitoring wells are trended. Any adverse trend is captured in the Station's Corrective Action Program. During the 4th quarter 2020, the tritium concentration unexpectedly increased in the samples collected from Unit 3 Yard Drain and bedrock aquifer well MW-PB-28, from less than 200 pCi/L to 1,670 pCi/L and 1,540 pCi/L, respectively. An additional sample was collected from both locations in the middle of January 2021. The tritium concentration in the sample collected from Unit 3 Yard Drain increased to 2,850 pCi/L and the tritium concentration in the sample collected from MW-PB-28 increased to 3,690 pCi/L. Tritium concentrations in the area of MW-PB-28 and Unit 3 Yard Drain decreased to less than 400 pCi/L by the end of 2021.

H. Investigations

<u>MW-PB-4</u>

In 2006, monitoring wells MW-PB-1 through MW-PB-14 were installed. Tritium activity was detected in MW-PB-4, located north of the Unit 3 Circulating Water Pump Structure and MW-PB-12, north of the Administration Building. Groundwater flow on site is from west to east. Monitoring wells were installed to the west, southwest and northwest of monitoring wells MW-PB-4 and MW-PB-12. The wells with the highest tritium activity are the wells installed directly east of and adjacent to the Unit 3 Turbine Building, wells MW-PB-24, 25, 26 and 27.

Investigation of potential sources identified that the likely source of groundwater contamination was due to degraded floor seams in the Unit 3 Turbine Building Moisture Separator area 116' elevation. Leaks internal to the building entered the groundwater through the degraded floor seams. The floor seams were repaired in August 2010. The floor in the Unit 3 Turbine Building Moisture Separator area 116' elevation was sealed and recoated in October 2011.

<u>MW-PB-29, 30 and 31</u>

An extent-of-condition inspection of the Unit 2 Turbine Building Moisture Separator area 116' elevation floor was performed in October 2010. Minor degradation of the floor seams was identified and repaired. In May 2011, monitoring wells MW-PB-29 and 30 were installed directly east of and adjacent to the Unit 2 Turbine Building; MW-PB-31 was installed southeast of and adjacent to the Unit 2 Turbine Building. These wells were installed to determine if a condition existed east of the Unit 2 Turbine Building that is similar to the condition east of the Unit 3 Turbine Building.

Tritium activity in these wells ranged from less than the MDC to 2,720 pCi/L. Samples from these wells were also analyzed for gamma-emitting isotopes and hard-to-detect radionuclides. All results are less than the MDC for each isotope.

The Unit 2 Turbine Building Moisture Separator floor 116' elevation floor was sealed and recoated in October 2012. Groundwater intrusion into a ventilation pit on the east side of the area was identified. The groundwater was removed and degraded seams in the ventilation pit were successfully repaired.

MW-PB-24, 25, 26 and 27

Wells MW-PB-24, 25, 26 and 27 are considered the wells of primary interest. These wells were sampled on a frequency ranging from weekly to quarterly. Below are 3 tables. The first lists the highest tritium activity of the wells of primary interest and the date of the sampling. The second table lists the highest tritium activity of the wells during 2021. The third table lists the activity of the wells from the last sampling of 2021. The tritium activity is in pCi/L.

Well #	Tritium Activity	Date
MW-PB-24	1,530	06/06/2018
MW-PB-25	161,000	03/08/2010
MW-PB-26	196,000	03/08/2010
MW-PB-27	71,800	2/22/2010

Well #	Tritium Activity	Date
MW-PB-24	406	09/28/2021
MW-PB-25	10,900	02/24/2021
MW-PB-26	353	09/28/2021
MW-PB-27	705	05/25/2021

Well #	Tritium Activity	Date
MW-PB-24	176	12/09/2021
MW-PB-25	193	12/09/2021
MW-PB-26	216	12/09/2021
MW-PB-27	499	12/09/2021

Potential sources of tritium in the groundwater are investigated via procedural processes and documented in the corrective action program. The most likely pathway for tritium to enter the groundwater has been determined to be leaks internal to the Unit 3 Turbine Building Moisture Separator 116', migrating through degraded floor seams or other unidentified openings in the floor.

MW-PB-28

Increased the monitoring frequency for MW-PB-28 in January and started an investigation to ensure there were no active leaks. Investigation of the areas of the Unit 3 Yard Drains and MW-PB-28 identified tritium in the Torus Dewater Tank Moat as a result of a small packing leak. It was noted that the condition of the Torus Dewatering Tank Moat could allow

for the leaking water to penetrate the concrete and seep into the ground.

I. Actions Taken

1. The Unit 3 Condensate storage tank moat, sump and valve pit were cleaned and recoated to eliminate a potential pathway for licensed material to enter the groundwater. These activities were completed under work order 04602739 and work request 01339203.
2. During P3R21, the Unit 3 Recombiner Jet Compressor room floor drains were found plugged. One plug was removed, and the second plug was modified to allow water to drain to the radwaste system in the event of a licensed material leak. This was completed under work request 01369404.
3. Installation of Monitoring Wells

   No groundwater monitoring wells were installed in 2021.
4. Actions to Recover/Reverse Plumes

   There were no actions to recover the plume.
5. Removed the tritiated water from the Torus Dewatering Tank Moat and repaired the packing leak. Sealed the cracks observed in the moat surface, temporarily recoated the moat and will be permanently recoating the moat in 2023.

J. Deviations

The data tables show that duplicate samples were obtained at several wells during 2021. These duplicate samples were obtained and analyzed for quality control purposes.

V. References

1. Conestoga Rovers and Associates, Fleetwide Assessment, Peach Bottom Atomic Power Station, Delta, PA, Fleetwide Assessment, Rev. 1, September 1, 2006.
2. Peach Bottom Atomic Power Station (PBAPS), Environs Radiation Monitoring Program, Preoperational Summary Report Units 2 and 3, June 1977.
3. Peach Bottom Atomic Power Station (PBAPS), Environs Radiation Monitoring Program, Preoperational Summary Report Units 2 and 3, September 1970-August 1973, January 1974.
4. Conestoga Rovers and Associates, Hydrogeologic Investigation Report, Peach Bottom Atomic Power Station, November 2012.
5. AMO Environmental Decisions, 2021 RGPP Summary Monitoring Reports, April 2021, August 2021, October 2021 and February 2021.

APPENDIX A

SAMPLING LOCATIONS, DISTANCE AND DIRECTION

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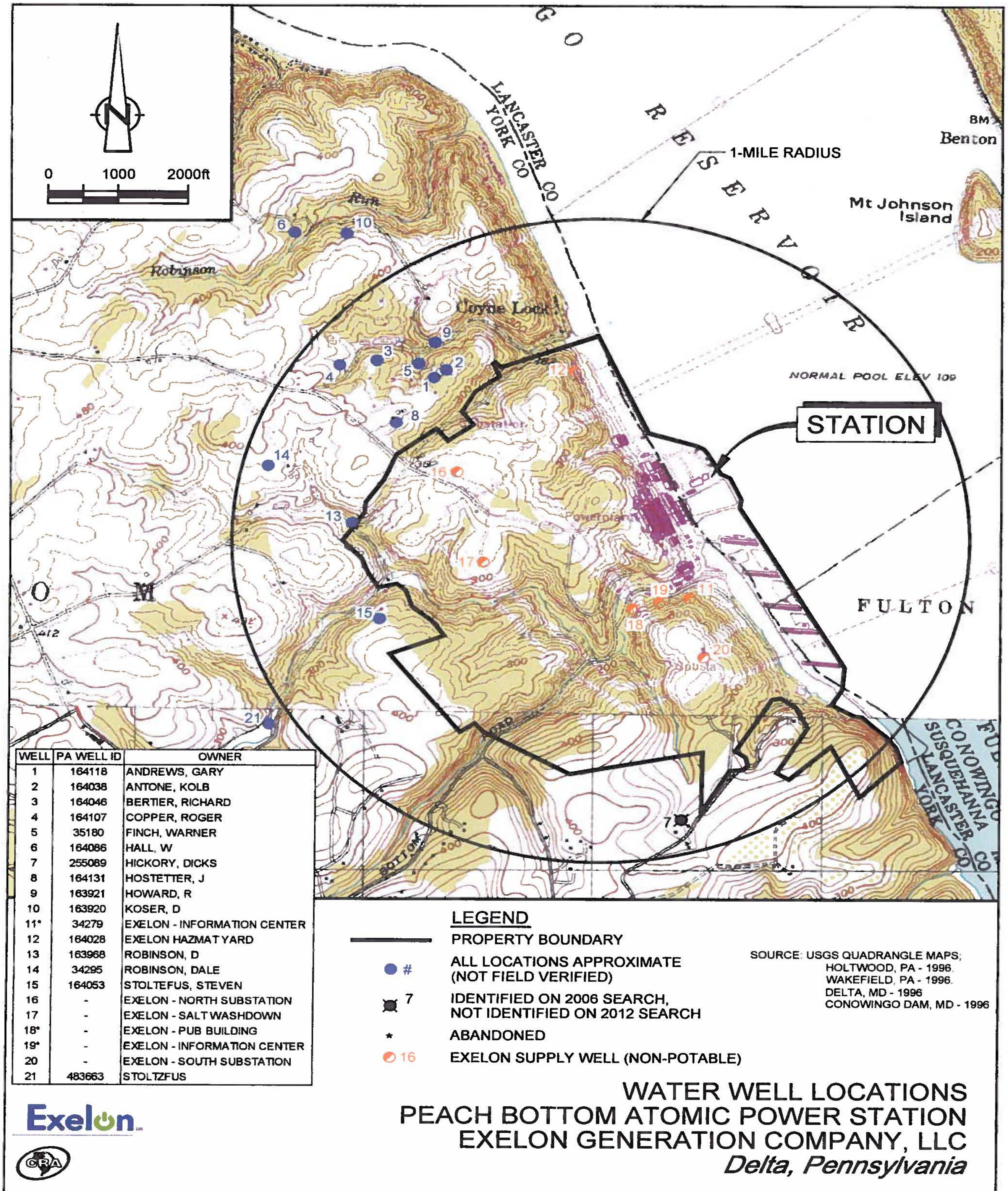
TABLE A-1: Radiological Groundwater Protection Program - Sampling Locations, Distance and Direction, Peach Bottom Atomic Power Station, 2021

Site	Site Type	Sector	Distance (ft.)
MW-PB-1	Groundwater Well	SW	1,166.6
MW-PB-2	Groundwater Well	WNW	309.0
MW-PB-3	Groundwater Well	SSE	709.7
MW-PB-4	Groundwater Well	ENE	350.2
MW-PB-5	Groundwater Well	NNW	1,146.1
MW-PB-6	Groundwater Well	NE	1,072.4
MW-PB-7	Groundwater Well	SE	813.9
MW-PB-8	Groundwater Well	SE	1,167.0
MW-PB-10	Groundwater Well	SSE	1,125.1
MW-PB-12	Groundwater Well	NNE	317.2
MW-PB-13	Groundwater Well	NW	329.4
MW-PB-15	Groundwater Well	SE	1,087.9
MW-PB-16	Groundwater Well	SE	1,101.6
MW-PB-19	Groundwater Well	NW	226.8
MW-PB-20	Groundwater Well	E	260.5
MW-PB-22	Groundwater Well	NE	315.4
MW-PB-24	Groundwater Well	N	185.9
MW-PB-25	Groundwater Well	N	159.7
MW-PB-26	Groundwater Well	NNE	121.1
MW-PB-27	Groundwater Well	NNE	139.1
MW-PB-28	Groundwater Well	NW	249.6
MW-PB-29	Groundwater Well	SE	325.0
MW-PB-30	Groundwater Well	SE	379.2
MW-PB-31	Groundwater Well	SE	450.1
SW-PB-1	Surface Water	NNW	2,850.5
SP-PB-1	Groundwater Seep	S	514.2
SP-PB-2	Groundwater Seep	WNW	311.6
U/2 YARD DRAIN SUMP	Groundwater	SSE	498.7
U/3 YARD DRAIN SUMP	Groundwater	WSW	175.8
PB-P1	Precipitation Water		
PB-P2	Precipitation Water		
PB-P3	Precipitation Water		
PB-P4	Precipitation Water		
PB-P5	Precipitation Water		
PB-P6	Precipitation Water		
PB-P7	Precipitation Water		
PB-P8	Precipitation Water		



53539-12(005)GN-WA008 NOV 6/2012

Figure A-1
Well Water Locations, Peach Bottom Atomic Power Station, 2021

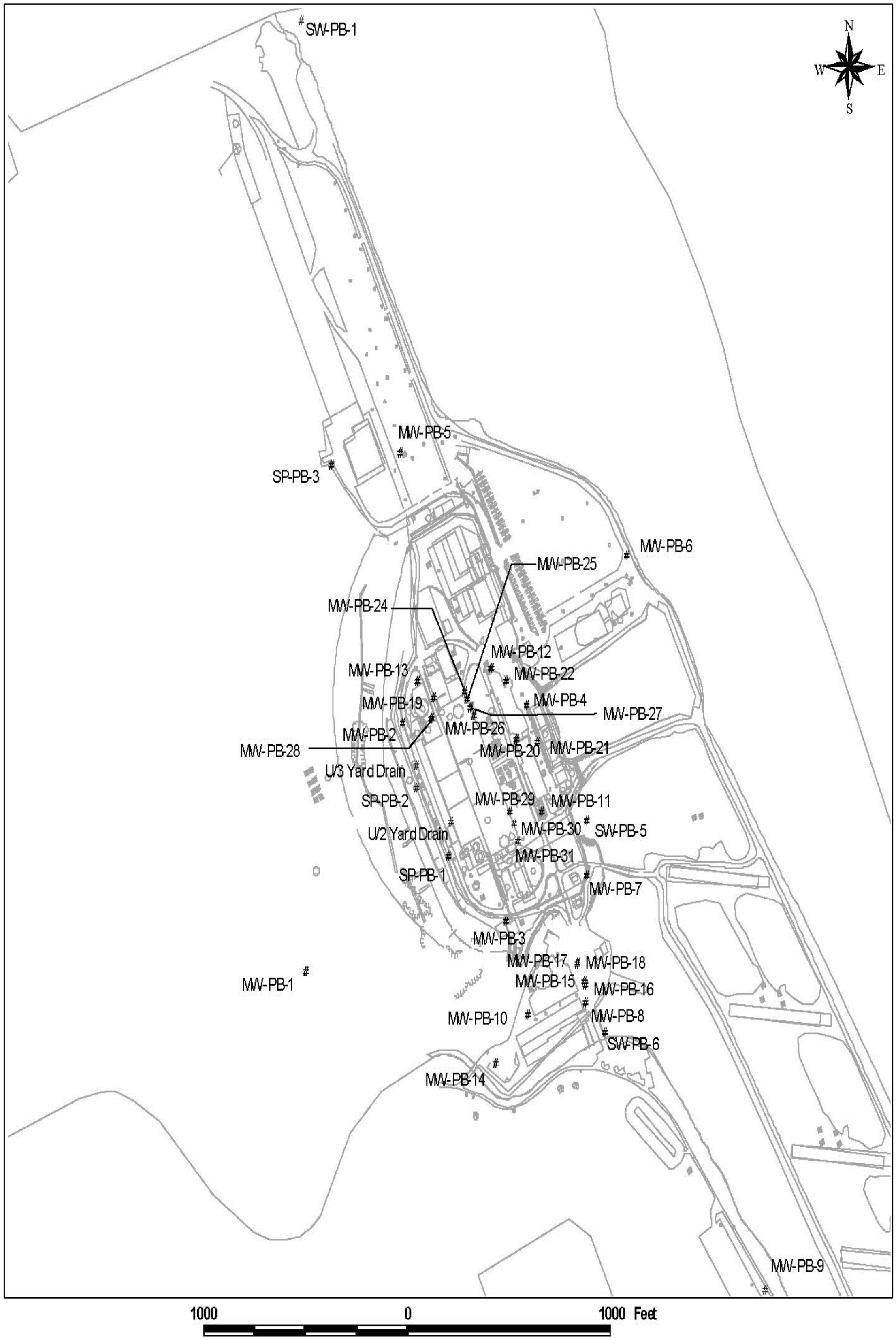


Figure A-2
RGPP Monitoring Locations
Peach Bottom Atomic Power Station, 2021

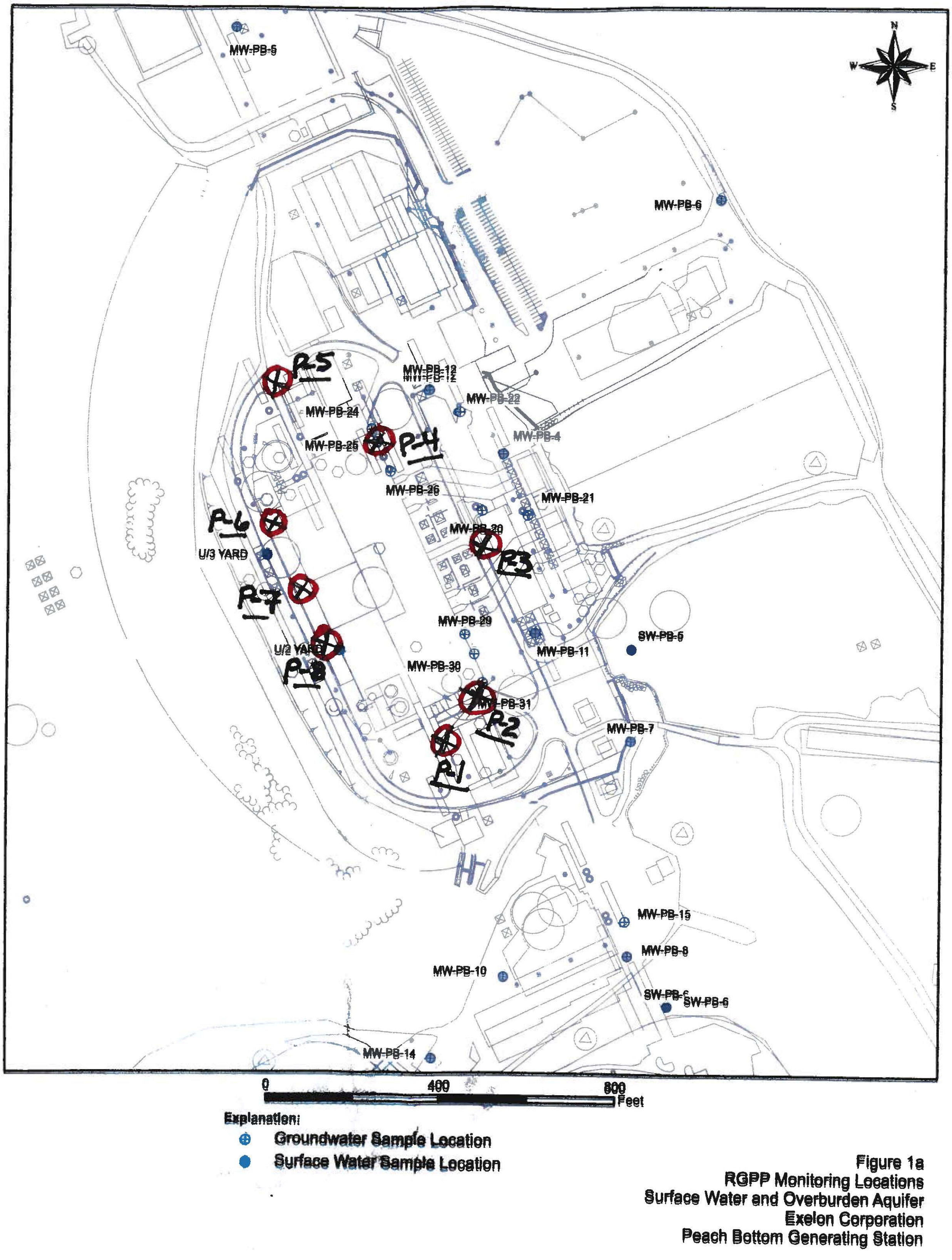


Figure A-3
RGPP Precipitation Monitoring Locations
Peach Bottom Atomic Power Station, 2021

APPENDIX B

DATA TABLES

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TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90
MW-PB-1	05/25/21		< 189		
MW-PB-1	05/25/21	*DUP*	< 186		
MW-PB-1	05/25/21	*GEL*	< 168		
MW-PB-2	01/20/21		< 182		
MW-PB-2	01/28/21		< 172		
MW-PB-2	02/04/21		< 190		
MW-PB-2	02/11/21		< 179		
MW-PB-2	02/17/21		< 177		
MW-PB-2	02/23/21		< 194		
MW-PB-2	03/02/21		< 174		
MW-PB-2	03/09/21		< 177		
MW-PB-2	03/16/21		< 178		
MW-PB-2	03/23/21		< 187		
MW-PB-2	03/30/21		< 184		
MW-PB-2	04/06/21		< 186		
MW-PB-2	04/13/21		< 171		
MW-PB-2	04/20/21		< 188		
MW-PB-2	04/27/21		< 193		
MW-PB-2	05/04/21		< 177		
MW-PB-2	05/11/21		< 191		
MW-PB-2	05/18/21		< 196		
MW-PB-2	05/26/21		< 186		
MW-PB-2	12/08/21		< 184		
MW-PB-3	05/27/21		< 185		
MW-PB-3	12/08/21		< 183		
MW-PB-4	05/26/21		< 187		
MW-PB-4	05/26/21	*DUP*	< 190		
MW-PB-4	05/26/21	*GEL*	< 165		
MW-PB-4	12/09/21		< 196		
MW-PB-5	05/26/21		< 192		
MW-PB-6	05/26/21		< 191		
MW-PB-7	05/26/21		< 189		
MW-PB-7	05/26/21	*DUP*	< 189		
MW-PB-7	05/26/21	*GEL*	< 170		
MW-PB-8	02/25/21		< 172		
MW-PB-8	05/25/21		< 185	< 7.4	< 0.8
MW-PB-8	08/19/21		< 162		
MW-PB-8	12/07/21		< 185		
MW-PB-10	02/25/21		< 176		
MW-PB-10	05/25/21		< 186	< 6.4	< 0.9
MW-PB-10	08/19/21		< 163		
MW-PB-10	12/07/21		< 192		
MW-PB-10	12/07/21	*DUP*	< 193		
MW-PB-10	12/07/21	*GEL*	< 148		
MW-PB-12	05/27/21		< 190		
MW-PB-12	12/09/21		< 185		
MW-PB-13	01/20/21		< 194		
MW-PB-13	01/28/21		< 167		
MW-PB-13	02/04/21		< 191		
MW-PB-13	02/11/21		< 176		
MW-PB-13	02/17/21		< 176		
MW-PB-13	02/23/21		< 199		
MW-PB-13	03/02/21		< 172		

TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90
MW-PB-13	03/09/21		212 ± 119		
MW-PB-13	03/16/21		< 180		
MW-PB-13	03/23/21		< 186		
MW-PB-13	03/30/21		< 190		
MW-PB-13	04/06/21		< 184		
MW-PB-13	04/13/21		< 174		
MW-PB-13	04/20/21		< 187		
MW-PB-13	04/27/21		< 193		
MW-PB-13	05/04/21		< 178		
MW-PB-13	05/11/21		< 190		
MW-PB-13	05/18/21		214 ± 122		
MW-PB-13	05/26/21		< 185		
MW-PB-13	12/08/21		< 191		
MW-PB-15	02/25/21		< 175		
MW-PB-15	02/25/21	*DUP*	< 177		
MW-PB-15	02/25/21	*GEL*	< 108		
MW-PB-15	05/25/21		< 190	< 6.4	< 0.9
MW-PB-15	08/19/21		< 166		
MW-PB-15	08/19/21	*DUP*	< 168		
MW-PB-15	08/19/21	*GEL*	< 130		
MW-PB-15	12/07/21		< 193		
MW-PB-16	02/25/21		< 177		
MW-PB-16	05/25/21		< 184	< 6.4	< 0.8
MW-PB-16	08/19/21		< 167		
MW-PB-16	12/07/21		< 199		
MW-PB-16	12/07/21	*DUP*	< 184		
MW-PB-16	12/07/21	*GEL*	< 151		
MW-PB-19	01/20/21		< 175		
MW-PB-19	01/28/21		< 172		
MW-PB-19	02/04/21		< 193		
MW-PB-19	02/11/21		< 178		
MW-PB-19	02/17/21		< 174		
MW-PB-19	02/23/21		< 194		
MW-PB-19	03/02/21		169 ± 111		
MW-PB-19	03/09/21		282 ± 120		
MW-PB-19	03/16/21		< 181		
MW-PB-19	03/23/21		< 185		
MW-PB-19	03/30/21		< 188		
MW-PB-19	04/06/21		196 ± 121		
MW-PB-19	04/13/21		238 ± 115		
MW-PB-19	04/20/21		< 190		
MW-PB-19	04/27/21		< 192		
MW-PB-19	05/04/21		< 179		
MW-PB-19	05/11/21		< 192		
MW-PB-19	05/18/21		< 189		
MW-PB-19	05/26/21		< 182	< 9.1	< 0.8
MW-PB-19	08/19/21		< 167		
MW-PB-19	11/05/21		< 197		
MW-PB-19	12/08/21		< 181		
MW-PB-20	02/25/21		< 173		
MW-PB-20	05/27/21		< 186	< 5.9	< 0.8
MW-PB-20	08/19/21		< 170		

TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90
MW-PB-20	12/09/21		< 184		
MW-PB-22	05/27/21		< 186		
MW-PB-22	12/09/21		284 ± 127		
MW-PB-24	01/20/21		< 182		
MW-PB-24	02/24/21		< 190		
MW-PB-24	03/23/21		< 185		
MW-PB-24	04/20/21		247 ± 125		
MW-PB-24	05/25/21		277 ± 130		
MW-PB-24	06/22/21		< 173		
MW-PB-24	07/20/21		227 ± 119		
MW-PB-24	08/19/21		220 ± 126		
MW-PB-24	09/28/21		406 ± 127		
MW-PB-24	10/26/21		< 196		
MW-PB-24	11/17/21		296 ± 118		
MW-PB-24	12/09/21		176 ± 110		
MW-PB-25	01/20/21		2470 ± 307		
MW-PB-25	02/24/21		10900 ± 1150		
MW-PB-25	03/23/21		5390 ± 602		
MW-PB-25	04/20/21		7800 ± 838		
MW-PB-25	05/25/21		5600 ± 622	< 7.3	< 0.8
MW-PB-25	06/22/21		3230 ± 383		
MW-PB-25	07/20/21		8120 ± 868		
MW-PB-25	08/19/21		9780 ± 1040		
MW-PB-25	09/28/21		10100 ± 1060		
MW-PB-25	10/26/21		1710 ± 247		
MW-PB-25	11/17/21		6700 ± 727		
MW-PB-25	12/09/21		193 ± 116		
MW-PB-26	01/20/21		< 178		
MW-PB-26	02/24/21		< 192		
MW-PB-26	03/23/21		216 ± 122		
MW-PB-26	04/20/21		247 ± 123		
MW-PB-26	05/25/21		215 ± 123	< 5.5	< 0.8
MW-PB-26	06/22/21		276 ± 116		
MW-PB-26	07/20/21		242 ± 120		
MW-PB-26	08/19/21		177 ± 112		
MW-PB-26	08/19/21	*DUP*	< 190		
MW-PB-26	08/19/21	*GEL*	164 ± 90		
MW-PB-26	09/28/21		353 ± 123		
MW-PB-26	11/17/21		310 ± 131		
MW-PB-26	12/09/21		216 ± 111		
MW-PB-27	01/20/21		316 ± 124		
MW-PB-27	02/24/21		< 188		
MW-PB-27	03/23/21		632 ± 147		
MW-PB-27	04/20/21		302 ± 126		
MW-PB-27	05/25/21		705 ± 151	< 9.0	< 0.9
MW-PB-27	06/22/21		238 ± 117		
MW-PB-27	07/20/21		360 ± 124		
MW-PB-27	08/19/21		228 ± 126		
MW-PB-27	09/28/21		322 ± 122		
MW-PB-27	10/26/21		527 ± 140		
MW-PB-27	11/17/21		374 ± 124		
MW-PB-27	12/09/21		499 ± 132		

TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE		H-3	Sr-89	Sr-90
MW-PB-28	01/20/21		3690 ± 429		
MW-PB-28	01/28/21		4100 ± 462		
MW-PB-28	02/04/21		4780 ± 542		
MW-PB-28	02/11/21		6130 ± 670		
MW-PB-28	02/17/21		8810 ± 931		
MW-PB-28	02/23/21		4110 ± 478		
MW-PB-28	03/02/21		5860 ± 636		
MW-PB-28	03/09/21		4050 ± 463		
MW-PB-28	03/16/21		12200 ± 1280		
MW-PB-28	03/17/21		11000 ± 1160		
MW-PB-28	03/23/21		9730 ± 1040		
MW-PB-28	03/30/21		5310 ± 595		
MW-PB-28	04/06/21		7820 ± 842		
MW-PB-28	04/13/21		11200 ± 1170		
MW-PB-28	04/20/21		8300 ± 888		
MW-PB-28	04/27/21		11500 ± 1210		
MW-PB-28	05/04/21		7840 ± 839		
MW-PB-28	05/11/21		5520 ± 616		
MW-PB-28	05/18/21		5650 ± 629		
MW-PB-28	05/25/21		1500 ± 223	< 7.9	< 1.0
MW-PB-28	06/02/21		2100 ± 277		
MW-PB-28	06/08/21		2660 ± 333		
MW-PB-28	06/22/21		561 ± 135		
MW-PB-28	07/20/21		1860 ± 253		
MW-PB-28	08/19/21		447 ± 137		
MW-PB-28	11/05/21		312 ± 135		
MW-PB-28	12/08/21		297 ± 118		
MW-PB-29	02/25/21		272 ± 118		
MW-PB-29	05/27/21		< 193	< 5.2	< 0.8
MW-PB-29	08/19/21		198 ± 112		
MW-PB-29	12/08/21		544 ± 143		
MW-PB-30	02/25/21		365 ± 122		
MW-PB-30	05/27/21		< 189	< 5.8	< 0.8
MW-PB-30	08/19/21		188 ± 113		
MW-PB-30	12/08/21		743 ± 155		
MW-PB-31	02/25/21		< 172		
MW-PB-31	02/25/21	*DUP*	< 178		
MW-PB-31	02/25/21	*GEL*	< 114		
MW-PB-31	05/27/21		< 190	< 7.1	< 0.8
MW-PB-31	08/19/21		< 169		
MW-PB-31	12/08/21		< 187		
U/2 YARD DRAIN	01/21/21		627 ± 144		
U/2 YARD DRAIN	05/24/21		244 ± 125	< 7.8	< 0.9
U/2 YARD DRAIN	09/17/21		451 ± 127		
U/2 YARD DRAIN	12/16/21		226 ± 105		
U/3 YARD DRAIN	01/18/21		2850 ± 344		
U/3 YARD DRAIN	01/28/21		3680 ± 424		
U/3 YARD DRAIN	02/04/21		1720 ± 244		
U/3 YARD DRAIN	02/11/21		1600 ± 226		
U/3 YARD DRAIN	02/17/21		804 ± 153		
U/3 YARD DRAIN	02/23/21		593 ± 145		
U/3 YARD DRAIN	03/02/21		1150 ± 179		
U/3 YARD DRAIN	03/09/21		897 ± 163		

TABLE B-I.1 CONCENTRATIONS OF TRITIUM AND STRONTIUM IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3	Sr-89	Sr-90
U/3 YARD DRAIN	03/16/21	772 ± 155		
U/3 YARD DRAIN	03/23/21	518 ± 138		
U/3 YARD DRAIN	03/30/21	534 ± 140		
U/3 YARD DRAIN	04/06/21	646 ± 144		
U/3 YARD DRAIN	04/13/21	633 ± 133		
U/3 YARD DRAIN	04/20/21	420 ± 130		
U/3 YARD DRAIN	04/27/21	494 ± 138		
U/3 YARD DRAIN	05/04/21	623 ± 141		
U/3 YARD DRAIN	05/11/21	562 ± 146		
U/3 YARD DRAIN	05/18/21	469 ± 137		
U/3 YARD DRAIN	05/25/21	400 ± 135	< 7.8	< 1.0
U/3 YARD DRAIN	06/02/21	339 ± 127		
U/3 YARD DRAIN	06/08/21	371 ± 128		
U/3 YARD DRAIN	06/22/21	406 ± 131		
U/3 YARD DRAIN	07/20/21	356 ± 125		
U/3 YARD DRAIN	08/19/21	< 194		
U/3 YARD DRAIN	11/05/21	316 ± 132		
U/3 YARD DRAIN	12/09/21	367 ± 133		

TABLE B-I.2

CONCENTRATIONS OF GAMMA EMITTERS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
MW-PB-28	04/06/21	< 2	< 3	< 6	< 3	< 6	< 4	< 6	< 4	< 4	< 3	< 12	< 4

TABLE B-I.3 **CONCENTRATIONS OF HARD-TO-DETECTS IN GROUNDWATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROECTION PROGRAM, PEACH BOTTOM ATOMIC STATION, 2021**

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	Am-241	Cm-242	Cm-243/244	Pu-238	Pu-239/240	U-234	U-235	U-238	Fe-55	Ni-63
MW-PB-8	05/25/21									< 154	< 5
MW-PB-10	05/25/21									< 79	< 5
MW-PB-15	05/25/21									< 114	< 5
MW-PB-16	05/25/21									< 51	< 4
MW-PB-19	05/26/21									< 90	< 4
MW-PB-20	05/27/21									< 137	< 5
MW-PB-25	05/25/21	< 0.13	< 0.03	< 0.11	< 0.17	< 0.14	0.93 ± 0.33	< 0.13	0.44 ± 0.21	< 51	< 5
MW-PB-26	05/25/21									< 153	< 5
MW-PB-27	05/25/21									< 73	< 5
MW-PB-28	05/25/21									< 78	< 4
MW-PB-29	05/27/21									< 163	< 4
MW-PB-30	05/27/21									< 188	< 4
MW-PB-31	05/27/21									< 104	< 5
U/2 YARD DRAIN	05/24/21									< 182	< 4
U/3 YARD DRAIN	05/25/21									< 76	< 5

TABLE B-II.1 CONCENTRATIONS OF TRITIUM IN SEEP SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM, PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
SP-PB-1	05/27/21	< 186
SP-PB-1	12/08/21	< 198
SP-PB-2	05/26/21	< 189
SP-PB-2	12/08/21	< 185

TABLE B-III.1 CONCENTRATIONS OF TRITIUM IN PRECIPITATION WATER SAMPLES COLLECTED AS PART OF THE RADIOLOGICAL GROUNDWATER PROTECTION PROGRAM , PEACH BOTTOM ATOMIC POWER STATION, 2021

RESULTS IN UNITS OF PCI/LITER ± 2 SIGMA

SITE	COLLECTION DATE	H-3
PB-P1	02/02/21	< 186
PB-P1	08/18/21	192 ± 107
PB-P2	02/02/21	< 188
PB-P2	08/18/21	< 188
PB-P3	02/02/21	< 187
PB-P3	08/18/21	210 ± 124
PB-P4	02/02/21	< 193
PB-P4	08/18/21	< 190
PB-P5	02/02/21	< 191
PB-P5	08/18/21	< 192
PB-P6	02/02/21	204 ± 124
PB-P6	08/18/21	< 188
PB-P7	02/02/21	< 188
PB-P7	08/18/21	< 193
PB-P8	02/02/21	< 185
PB-P8	08/18/21	< 189

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