Constellation.

May 30, 2023

U.S. Nuclear Regulatory Commission
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Peach Bottom Atomic Power Station Units 2 and 3
Independent Spent Fuel Storage Installation (ISFSI)
Facility Operation License DPR-44 and DPR-56
NRC Docket 50-277 and 50-278 and ISFSI Docket 72-29

Subject: Annual Radiological Environmental Operating Report 80
January 1, 2022 through December 31, 2022

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 Operating Report 80. This report provides the 2022 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 Erika Wagner at 717-456-3716.

Sincerely,

Stiltner, Ryan C

Digitally signed by Stiltner, Ryan C
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Ryan Stiltner, Acting Plant Manager
Peach Bottom Atomic Power Station

RS/WS/MR/TJH/DM/EW

Enclosure (1) – 2022 Annual Radiological Environmental Operating Report
Cc: USNRC Regional Administrator – NRC Region 1
NRC Senior Resident Inspector – Peach Bottom Atomic Power Station
USNRC Project Manager – NRR
Director, Bureau of Radiation Protection – Pennsylvania Department of Environmental Protection

CCN 23-44

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT NO. 80 FOR THE PEACH BOTTOM ATOMIC POWER STATION

UNITS 2 AND 3

January 1 - December 31, 2022

Prepared by
Constellation Generation Solutions

CONSTELLATION GENERATION
CONSTELLATION NUCLEAR LLC

MAY 2023

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. EXECUTIVE SUMMARY

Executive Summary

The 2022 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 Constellation Nuclear and covers the period of 1 January 2022 through 31 December 2022. Throughout that time period, 1,567 analyses were performed on 1,247 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. There was no tritium detected above the required lower limit of detection (LLD) of 200 pCi/L. 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 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 were 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 2022, 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:

Radiological Impact on Man

Effluent	Applicable Organ	Estimated Dose	% of Applicable Limit	Limit	Unit
Noble Gas	Gamma - Air Dose	9.02E-03	4.51E-02	2.00E+01	mrad
Noble Gas	Beta - Air Dose	6.27E-03	1.57E-02	4.00E+01	mrad
Noble Gas	Total Body (gamma)	8.72E-03	8.72E-02	1.00E+01	mrem
Noble Gas	Skin (Beta)	1.15E-02	3.84E-02	3.00E+01	mrem
Gaseous Iodine, Particulate, Carbon-14 & Tritium	Bone	1.43E-01	4.77E-01	3.00E+01	mrem
Gaseous Iodine, Particulate & Tritium	Thyroid	2.01E-03	6.70E-03	3.00E+01	mrem
Liquid	Total Body (gamma)	2.94E-04	4.90E-03	6.00E+00	mrem
Liquid	GI-LLI	3.08E-04	1.54E-03	2.00E+01	mrem
Direct Radiation	Total Body	0	0.00E+00	2.50E+01	mrem

40 CFR 190 Doses

		40 CFR 190		
Applicable Organ	Estimated Dose	% of Applicable Limit	Limit	Unit
Total Body	3.89E-02	1.56E-01	2.50E+01	mrem
Thyroid	3.08E-02	4.11E-02	7.50E+01	mrem
Other Organ	1.56E-01	6.23E-01	2.50E+01	mrem
			ODCM 3.8.D.1.d and e.	
Total Body	3.89E-02	1.30E+00	3.00E+00	mrem
Other Organ	1.56E-01	5.20E+00	3.00E+00	mrem
Thyroid	3.08E-02	5.60E-02	5.50E+01	mrem

II. PEACH BOTTOM ATOMIC POWER STATION RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

II.A. 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, Constellation Generation Solutions (CGS) and GEL Laboratories on samples collected during the period 01 January 2022 through 31 December 2022.

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.

A. 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.

B. Sources of Radiation

As mentioned previously, naturally occurring radioactivity has always been a part of our environment. Table 1 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/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 radio-pharmaceuticals. 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 2022 operating period.

II.B. PROGRAM

II.B.1 Objectives

A. Objective of the REMP

1. Provide data on measurable levels of radiation and radioactive materials in the site environs;
2. Validate the radioactive effluent control program by evaluating the relationship between quantities of radioactive material released from the plant and resultant radiation doses to individuals from principal pathways of exposure.

B. Implementation of the Objectives

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

II.B.2 Sample Collection and Analysis

Samples for the PBAPS REMP were collected for Constellation Nuclear by contractors to, or personnel of, CGS according to applicable procedures (Ref 13,19,20). Control locations are sample locations that are not expected to be impacted by plant operations and are used to determine a baseline in the environment for each type of sample. This section describes the general collection methods used to obtain environmental samples for the PBAPS REMP in 2022.

The locations of the individual sampling stations are listed in Table A-1 and A-2 and shown in Figures A-1, A-2, and A-3.

Analyses are performed in accordance with applicable procedures (Ref 14,17,18,20) and results are provided in Appendix B for primary REMP Analysis. Analysis results for quality assurance are provided in Appendix C. Analysis results for PBAPS RGPP are provided in Appendix E.

All Samples were collected and analyzed as required except as noted in section II.B.4 Program exceptions.

II.B.2.a Aquatic Environment

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.

II.B.2.b Atmospheric 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 one cubic foot per minute to obtain a minimum total volume of 280 cubic meters. The weekly filters were composited for a quarterly sample.

II.B.2.c Terrestrial Environment

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.

II.B.2.d 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;

   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;

2. And on hills free from local obstructions and within sight of the vents (where practical).

Each dosimetry location in the environment has 2 OSLD type 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.

II.B.2.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 the ISFSI on the 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 2022, 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. In 2022, five (5) spent fuel casks were generated and placed on the pad. No Facility related dose was detected by the OSLDs deployed to monitor the ambient radiation around the ISFSI.

II.B.3 Data Interpretation

The radiological environmental and direct radiation data collected prior to PBAPS becoming operational was used as a baseline with which the 2022 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. Lower Limit of Detection and Minimum Detectable Concentration

   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. Net Activity Calculation and Reporting of Results

   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. MDA 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 2022 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 MDA) 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.

II.B.4 Program Exceptions

For 2022 the PBAPS REMP had a sample recovery rate of greater than 99%. Program exceptions are listed below:

1. An exception was recorded for a fish sample collected from Location 6 between 06/04/2022 and 06/05/2022. It was determined that the sample was lost in shipping and never reached the laboratory for analysis. The REMP program allows this type of deviation and there were no other such losses in 2022.

2. An exception was recorded for a lost air sample at location 3A for the week ending 08/11/2022. It was observed that the GFCI switch on the power outlet had blown possibly due to storms that occurred on 08/04/2022. The run time could not be accurately determined and was invalidated for reporting.

Each program exception was reviewed to understand the causes of the program exception. The occasional equipment breakdowns were unavoidable. The overall sample recovery rate indicates that the appropriate procedures and equipment were in place to assure reliable program implementation.

II.B.5 Program Changes

A dosimeter was moved at Station Code 42 from 21,600ft to 21,500ft due to the property being demolished. There were no other program changes in 2022

II.C. RESULTS AND DISCUSSIONS

All the environmental samples collected during the year were analyzed using CGS laboratory procedures CY-ES-205 and CY-ES-206, except Tritium which was analyzed by GEL Laboratories (GL-RAD-A-002 REV# 24), in accordance with analytical method EPA 906.0 Modified, and Dosimetry analysis performed by Landauer. Table 1 is a Synopsis of the 2022 Radiological Environmental Monitoring Program samples and types of analyses performed. The analytical results for this reporting period are presented in Appendix B and radioactivity in the Environs of the PBAPS are also summarized in Table 2 as required by NUREG 1302 'Branch Technical Position Paper' (9) Table 3. For discussion, the analytical results are divided into four categories. The categories are Aquatic Environment, Atmospheric Environment, Terrestrial Environment, and Direct Radiation. These categories are further divided into subcategories according to sample type (e.g. Surface Water/Drinking Water and Aquatic Organisms for Aquatic Environment).

II.C.1 Aquatic Environment

The aquatic environment was evaluated by performing radiological analyses on samples of surface water, drinking water, fish, and sediment.

II.C.1.a Surface and Drinking Water

1. Surface Water

   A summary of the 2022 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 B-1, Appendix B)

   Iodine

   Monthly samples were analyzed for low level I-131. I-131 is a gamma emitter that is analyzed separately to achieve a low level of detection. All results were less than the MDA and the required LLD was met. (Table B-1, Appendix B)

   Gamma Spectrometry

   Monthly samples were analyzed for gamma emitting nuclides. All nuclides were less than the MDA and all required LLDs were met. (Table B-1, Appendix B)

2. Drinking Water

The results from the drinking water samples collected in 2022 from indicator locations 13B and 4L as well as control location, 6I are described below:

Gross Beta

Samples from all locations were analyzed monthly for concentrations of gross beta activity (Table B-1, Appendix B and Figure A-7 Appendix A). Gross beta activity was detected in all 36 samples. The values ranged from 1.07 to 7.32 pCi/L with a mean value of 2.42 ± 0.76 pCi/L for indicator locations. For the control location, the values ranged from 1.22-2.41 pCi/L with a mean value of 1.89 ± 0.77 pCi/L which is less than the required LLD (4 pCi/L) and 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. No tritium activity was detected in any of the 12 samples. All samples measured less than the required MDA (200 pCi/L) and the required LLD was met. (Table B-1, Appendix B)

Iodine

Monthly samples were analyzed for low level I-131. I-131 is a gamma emitter that is analyzed separately to achieve a low level of detection. All results were less than the MDA and the required LLD was met. (Table B-1, Appendix B)

Gamma Spectrometry

Samples from the three locations were analyzed monthly for gamma emitting nuclides. All nuclides were less than the MDA and all required LLDs were met. (Table B-1, Appendix B)

A Radiological Groundwater Protection Program (RGPP) was established in 2006 as part of a Constellation Nuclear (Exelon) fleetwide assessment of potential groundwater intrusion from the operation of the Station. Results and Discussion of groundwater samples are covered in Appendix E.

II.C.1.b Aquatic Organisms

The edible portions of Fish (predator and bottom feeder) samples collected from locations 4 and 6 in 2022 were analyzed for concentrations of gamma-emitting nuclides. There is a program exception for one sample from Location 6 collected in June of 2022. The sample was determined to be lost in transit and never reached the lab for analysis and is discussed in Section II.B.4 Program Exceptions. For all samples analyzed, naturally occurring K-40 was found at all stations and ranged from 2,824 to 3,304 pCi/kg (wet), with a mean value of 3,076 ± 235 pCi/kg (wet), consistent with levels detected in previous years. No fission or activation products, due to plant operations were found in 2022 and all required LLDs were met

Table B-2, presents the non-natural gamma radionuclide results for locations 4 and 6, based on the type of fish collected. All sample results were less than the nuclide-specific MDAs and LLD requirements were met. There have been no detectable levels of Cs-137 in fish since 1983.

II.C.1.c Sediment

Sediment samples were collected at locations 6F, 4J, and 4T and analyzed for concentrations of gamma-emitting nuclides. No plant related fission or activation products were found in sediment and all LLDs were met. Results are presented in Table B-3, Appendix B.

Naturally occurring K-40 was found in all locations and ranged from 10,470 to 22,150 pCi/kg (dry) with a mean value of 13,587 ± 1,197 pCi/kg (dry).

II.C.2 Atmospheric Environment

The atmospheric environment was evaluated by performing radiological analyses on samples of air particulate and airborne iodine. Airborne iodine and particulate samples were collected and analyzed weekly at five locations (1B, 1C, 1Z/1A, 3A, and 5H2). The control location was 5H2. Airborne iodine and particulate samples were obtained at each location, using a vacuum pump with charcoal and glass fiber filters attached. The pumps were run continuously and sampled air at the rate of approximately one cubic foot per minute. The filters were replaced weekly and sent to the laboratory for analysis.

II.C.2.a Air Particulate Filters

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).

Detectable gross beta activity was observed at all locations. Onsite results, Group I, ranged from 1.21E-2 to 5.97E-2 pCi/m^3, with a mean of 2.87E-2 ± 0.25E-2 pCi/m^3. The results from local community, Group II, ranged from 1.23E-2 to 7.0E-2 pCi/m^3 with a mean of 3.2E-2 ± 0.28E-2 pCi/m^3. The control, Group III, results ranged from 1.3E-2 to 5.1E-2 pCi/m^3 with a mean of 2.83E-2 ± 0.24-2 pCi/m^3.

The range of detectable results and mean value from all locations are generally within range of their 2 sigma errors, indicating the gross beta activity is not a result of the operation of PBAPS. As shown in Figure A-6, Appendix A, the control location data mirrors the individual on-site locations and community trends. In addition, a comparison of the 2022 air particulate data with historical data of the last 10 years is presented in Figure A-5, Appendix A, and supports this trend over the time.

Based on individual weekly comparisons, there was no statistical difference between the Control and Indicator radioactive particulate concentrations. The average for the control samples were 0.028 pCi/m3, and the average for the indicators were 0.031 pCi/m3 for the period of January to December 2022. Maximum weekly concentrations for each station were less than 0.060 pCi/m3. The community represented location, 3A, also showed an average of 0.032 pCi/m3 in 2022 with weekly measurements ranging from .012 to 0.070 pCi/m3. The results of these analyses are presented in Table B-5, Appendix B. All LLDs were met for samples successfully collected. There was one lost sample for the week of 08/11/2022 due to a loss of power causing that sample to be excluded from the report. The program exception is discussed in Section II.B.4 of this report.

The particulate filters from each sampling location were saved and a 13-week composite was made. These air particulate samples were then analyzed for concentrations of-gamma emitting nuclides. No fission or activation products were detected. The results of these analyses are listed in Tables B-6, Appendix B. Gross beta and cosmogenic, naturally occurring beryllium-7 (Be-7) were detected at levels consistent with those detected in previous years. All power production nuclides were less than the MDA and all required LLDs were met.

II.C.2.b Air Iodine

High-sensitivity I-131 analyses were performed on weekly air samples. All results were less than the minimum detectable concentration.

Radioiodine cartridges are placed at five locations. These cartridges are changed and analyzed each week. These samples were analyzed for radioiodine species and exhibited no detectable concentrations of I-131 during the year and is consistent with historical trends. Table B-4 lists the sample collection period and if the sample successfully met MDA or if results were excluded. There was one lost sample for the week of 08/11/2022 due to a loss of power causing that sample to be excluded from the report. The program exception is discussed in Section II.B.4 of this report.

II.C.3 Terrestrial Environment

II.C.3.a Vegetation

Broadleaf vegetation was collected monthly, during the growing season, at four locations (1C, 2Q, 3Q and 55). The control location was 55.

Throughout the growing season of 2022, 48 samples of various green leafy vegetation (Swiss chard, cabbage, collards, kale, broccoli, etc.) were collected and analyzed for concentrations of gamma emitting nuclides (Table B-7, Appendix B). The results are discussed below:

Gamma Spectrometry

Naturally occurring Be-7 activity was found in 36 of 48 samples and ranged from 148 to 2,300 pCi/kg (wet), with a mean of 712 ± 1,220 pCi/kg (wet). Also, naturally occurring K-40 activity was found in all samples and ranged from 1,248 to 8,258 pCi/kg (wet), with a mean of 4,205 ± 312 pCi/kg (wet). All power production nuclides were less than the MDA and all required LLDs were met.

Data for Non Natural Gamma Emitters is given in Table B-7.

II.C.3.b Milk

During 2022, 129 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 B-8, Appendix B). All results were less than the MDA for I-131 and all required LLDs were met. 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 B-8, Appendix B). Naturally occurring K-40 was found in all samples and ranged from 1,074 to 3,033 pCi/l, with a mean value of 1404 ± 125 pCi/L. All other nuclides were less than the MDA and all required LLDs were met.

There was no Cs-134 or Cs-137 detected in the milk samples collected in 2022. Samples were routinely counted to MDAs that are less than half the required LLDs to be conservative.

Cow milk samples were analyzed for concentrations of I-131 and gamma-emitting nuclides. Concentrations of naturally-occurring K-40 were consistent with those detected in previous years. No fission or activation products were found. Gamma isotopic data is given in Table B-8.

II.C.4 Direct Radiation

Environmental ambient gamma radiation measurements were performed quarterly using Dosimeters of Legal Record (DLR). Levels detected were consistent with those observed in previous years and no facility-related dose was detected. A review of the dosimetry data for the nearest residence to the Independent Spent Fuel Storage Installation (ISFSI) indicates no direct dose was received.

Ambient Gamma Radiation

Results of OSLD measurements are listed in Table B-11. In 2019, six years of OSLD data (2012-2018) were re-evaluated with the new methodology presented in Constellation Nuclear 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 (BQ/A + MDDQ/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 B-11 and B-12 respectively. 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 A-9 displays the BA + MDDA 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. All locations showed no normalized net quarterly dose above the BA + MDDA, therefore, there is no detectable ambient gamma radiation to the members of the public due to PBAPS operations.

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.

In 2022, five (5) spent fuel casks were generated and placed on the pad. No Facility related dose was detected by the OSLDs deployed to monitor the ambient radiation around the ISFSI.

II.D. CONCLUSION

In assessing the data gathered for this report and comparing these results with preoperational data, it was concluded that the operation of The Peach Bottom Atomic Power Station had no adverse radiological impact on the environment.

Table 1

Synopsis of 2022 Peach Bottom Atomic Power Station Radiological Environmental Monitoring Program

Sample Type	Sampling Frequency[1]	Number of Locations	Number Collected	Analysis	Analysis Frequency[1]	Number Analyzed
Aquatic Environment						
Surface Water, Drinking Water	MC	5	60	Gamma	MC	60
				Gross Beta	MC	36
				Tritium	QC	20
Fish[2]	SA	2	8	Gamma	SA	7
Shoreline Sediment	SA	3	6	Gamma	SA	6
Atmospheric Environment						
Air Iodine[3]	W	5	254	I-131	W	254
Air Particulates[4]	W	5	254	Gross Beta	W	254
				Gamma	QC	20

Table 1

Synopsis of 2022 Peach Bottom Atomic Power Station Radiological Environmental Monitoring Program

Sample Type	Sampling Frequency[1]	Number of Locations	Number Collected	Analysis	Analysis Frequency[1]	Number Analyzed
Terrestrial Environment						
Milk[5]	M/BW	5	105	Gamma	M/BW	105
	Q	6	24	Gamma	Q	24
Vegetation[6]	M	4	48	Gamma	M	48
Dosimetry	Q	48	384	Direct Radiation	Q	384

[1] W=Weekly, BW=BiWeekly (15 days), M=Monthly (31 days), Q=Quarterly (92 days), SA=Semiannual, A=Annual, C=Composite
[2] Twice during fishing season including at least four species
[3] The collection device contains activated charcoal
[4] Beta counting is performed >= 24 hours following filter change. Gamma spectroscopy performed on quarterly composite of weekly samples
[5] Bi-Weekly during growing season.
[6] Monthly during growing season. Samples include broad leaf vegetation

Table 2

Annual Summary of Radioactivity in the Environs of the

Peach Bottom Atomic Power Station

Medium or Pathway Sampled (Unit of Measurement)	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	Indicator Locations Mean (F)/Range[1]	Location with Highest Annual Mean Name/Distance & Direction[2]	Highest Annual Mean (F) / Range[1]	Control Locations Mean (F)/Range
Aquatic Environment						
Surface Water, Drinking Water (pCi/L)	Gross Beta (36)	4	2.42 (24/24) (1.07-7.32)	CWA Susquehanna Pumping Sta. 13B 4.1 km ESE	2.73 (12/12) (1.33-7.32)	1.89 (12/12) (1.22-2.41)
Atmospheric Environment						
Air Particulates (10^{-2} pCi/m^3)	Gross Beta (254)	1.0	3.0 (204/204) (1.2-7.0)	Delta, PA Sub. 3A 5.88 km SW	3.2 (51/51) (1.2-7.0)	2.9 (51/51) (1.3-5.1)
Dosimetry (mrem/91 days)	OSLD (384)	NA	22.2(368/368) (12.2-35.6)	Transmission Line Hill/ISFSI Pad 1R 0.85 km SSE	33.6 (16/16) (30.7 -35.6)	20.7 (16/16) (13.7-27.2)

[1] Mean and range based upon detectable measurements only. Fraction (F) of detectable measurements at specified location is indicated in parentheses
[2] From the centerpoint of the containment building

V. 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

13. Constellation Generation Solutions Sampling Procedures
   a. CY-ES-214, Collection of RGPP Water Samples for Radiological Analysis
   b. CY-ES-237, Air Iodine and Air Particulate Sample Collection for Radiological
   c. CY-ES-239, EIS Collection Exchange of Field Dosimeters for Radiological Analysis
   d. CY-ES-241, Vegetation Sample Collection for Radiological Analysis
   e. CY-ES-242, Soil and Sediment Sample Collection for Radiological Analysis
   f. CY-ES-247, Precipitation Sampling and Collection for Radiological Analysis

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   a. CY-ES-204, Sample Preparation for Gamma Analysis
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   c. CY-ES-206, Operation of the Tennelec S5E Proportional Counter
   d. CY-ES-246, Sample Preparation for Gross Beta Analysis

15. Peach Bottom Atomic Power Station 2022 Land use Survey

16. CY-AA-170-1000, Radiological Environmental Monitoring Program (REMP) and Meteorological Program Implementation.

17. Teledyne Browne Engineering, (TBE) 2018 Analysis Procedures Current Revisions
   a. TBE-2001 Alpha Isotopic and Pu-241
   b. TBE-2006 Iron-55 Activity in Various Matrices
   c. TBE-2007 Gamma Emitting Radioisotope Analysis
   d. TBE-2008 Gross Alpha and/or Gross Beta Activity in Various Matrices
   d. TBE-2011 Tritium Analysis in Drinking Water by Liquid Scintillation
   e. TBE-2013 Radionickel Activity in Various Matrices
   f. TBE-2019 Radiostrontium Analysis by Ion Exchange

18. GEL Laboratory Procedures
   a. GL-RAD-A-002 Tritium
   b. GL-RAD-A-022 Ni-63
   c. GL-RAD-A-004 Sr89/90, Liquid
   d. GL-RAD-A-040 Fe-55

19. Normandeau Associates, Inc. (NAI) Sampling Procedures Current Revisions
   a. Procedure No. ER2 Collection of Silt Samples for Radiological Analysis
   b. Procecure No. ER3 Collection of Fish Samples for Radiological Analysis

20. Landauer Incorporated, Analysis procedure proprietary, Current Revision

21. Teledyne Browne Engineering Environmental Services, 4th Quarter 2022 Quality Assurance Report, January – December 2022

22. GEL 2022 Annual Environmental Quality Assurance Report for the Radiological Environmental Monitoring Program (REMP)

APPENDIX A

Sample Locations for the REMP

Appendix A contains information concerning the environmental samples which were collected during this operating period.

Sample locations and specific information about individual locations for the PBAPS are given in Table A-1 and A-2. Figure A-1 shows the Environmental Sampling Locations within 1 mile of the Peach Bottom Atomic Power Station. Figures A-2 shows the Environmental Sampling Locations Between 1 and 5 miles and A-3 shows the locations Greater than 5 miles from Peach Bottom Atomic Power Station.

TABLE OF CONTENTS - SAMPLING LOCATIONS

TABLE A-1

Radiological Environmental Monitoring Program – Sampling Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2022

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		9,500feet NW
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 A-2

Radiological Environmental Monitoring Program – OSLD Locations, Distance and Direction from Reactor Buildings, Peach Bottom Atomic Power Station, 2022

Location	Location Description	Distance & Direction from Site
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 350° Sector Hill	3,000 feet NNW
1F	Peach Bottom 200° Sector Hill	2,900 feet SSW
1G	Peach Bottom North Substation	3,100 feet WNW
1H	Peach Bottom 270° Sector Hill	3,200 feet W
1I	Peach Bottom South Substation	2,900 feet S
1J	Peach Bottom 180° 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 130° 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	21,500 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*

Figure A-1

Peach Bottom Atomic Power Station Sample Locations
Environmental Sampling Locations Within 1 mile of the
Peach Bottom Atomic Power Station, 2022

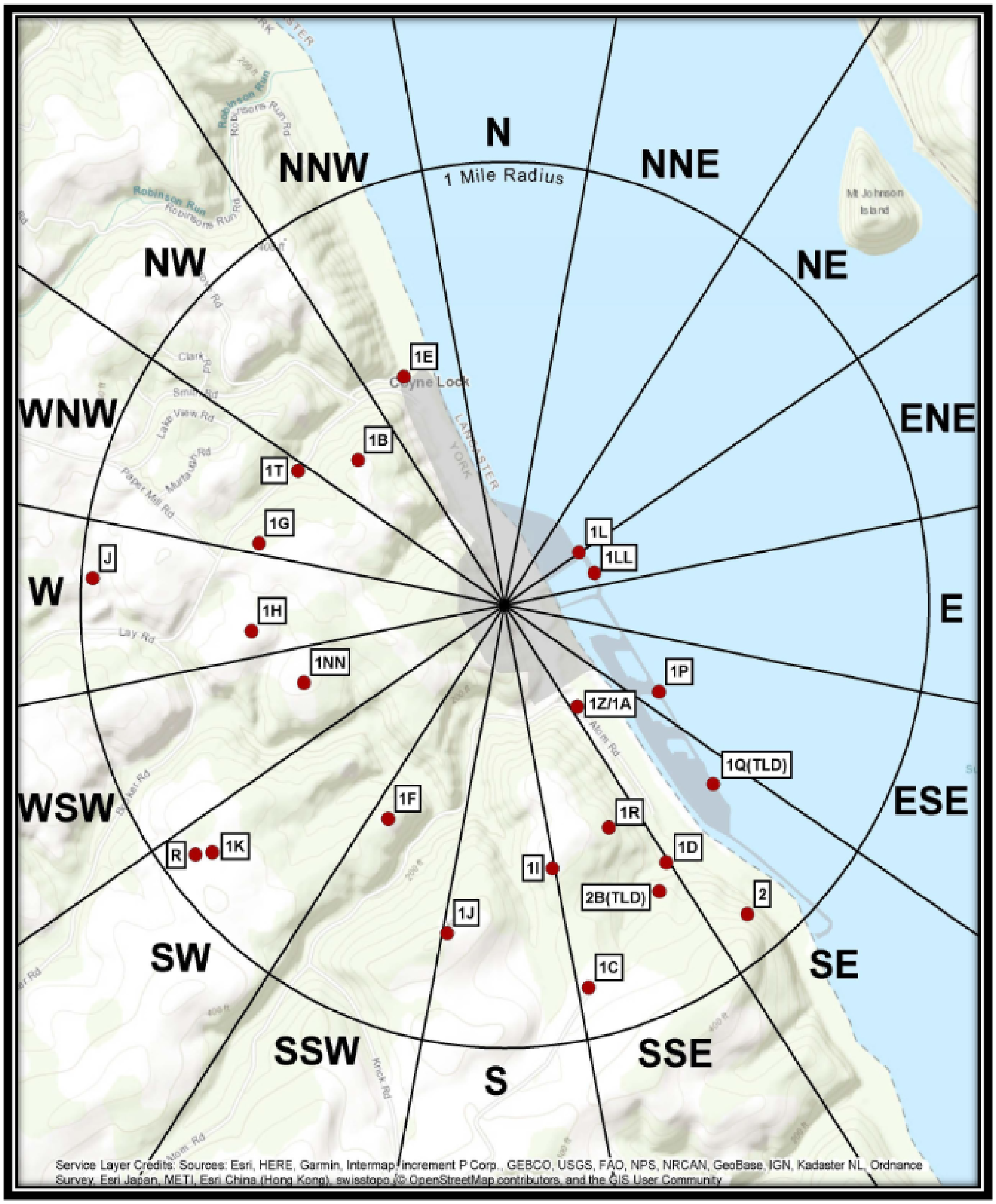


Figure A-2

Peach Bottom Atomic Power Station Sample Locations
Environmental Sampling Locations Between 1 and 5 miles from the Peach Bottom Atomic Power Station, 2022

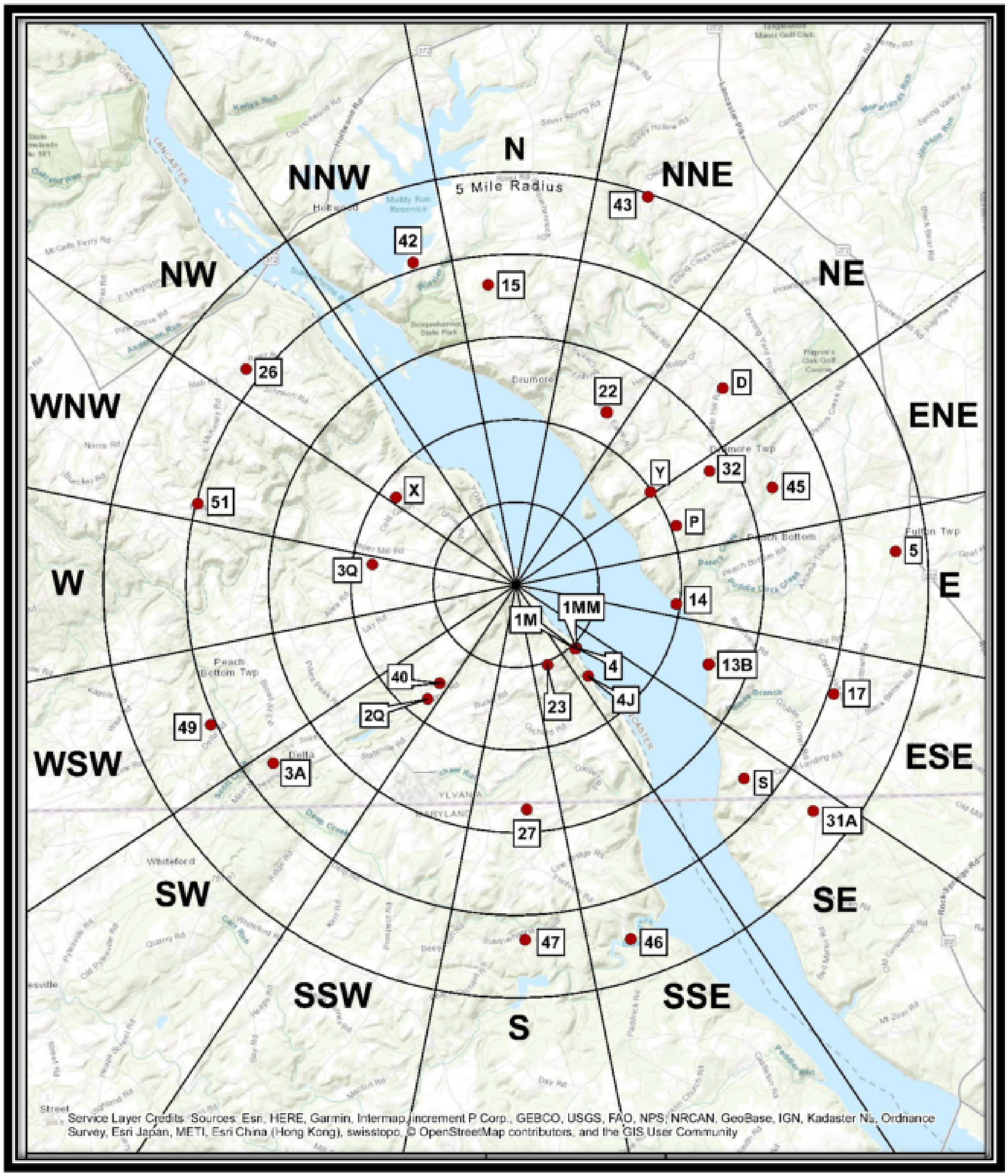


Figure A-3

Peach Bottom Atomic Power Station Sample Locations

Environmental Sampling Locations Greater than 5 miles from the Peach Bottom Atomic Power Station, 2022

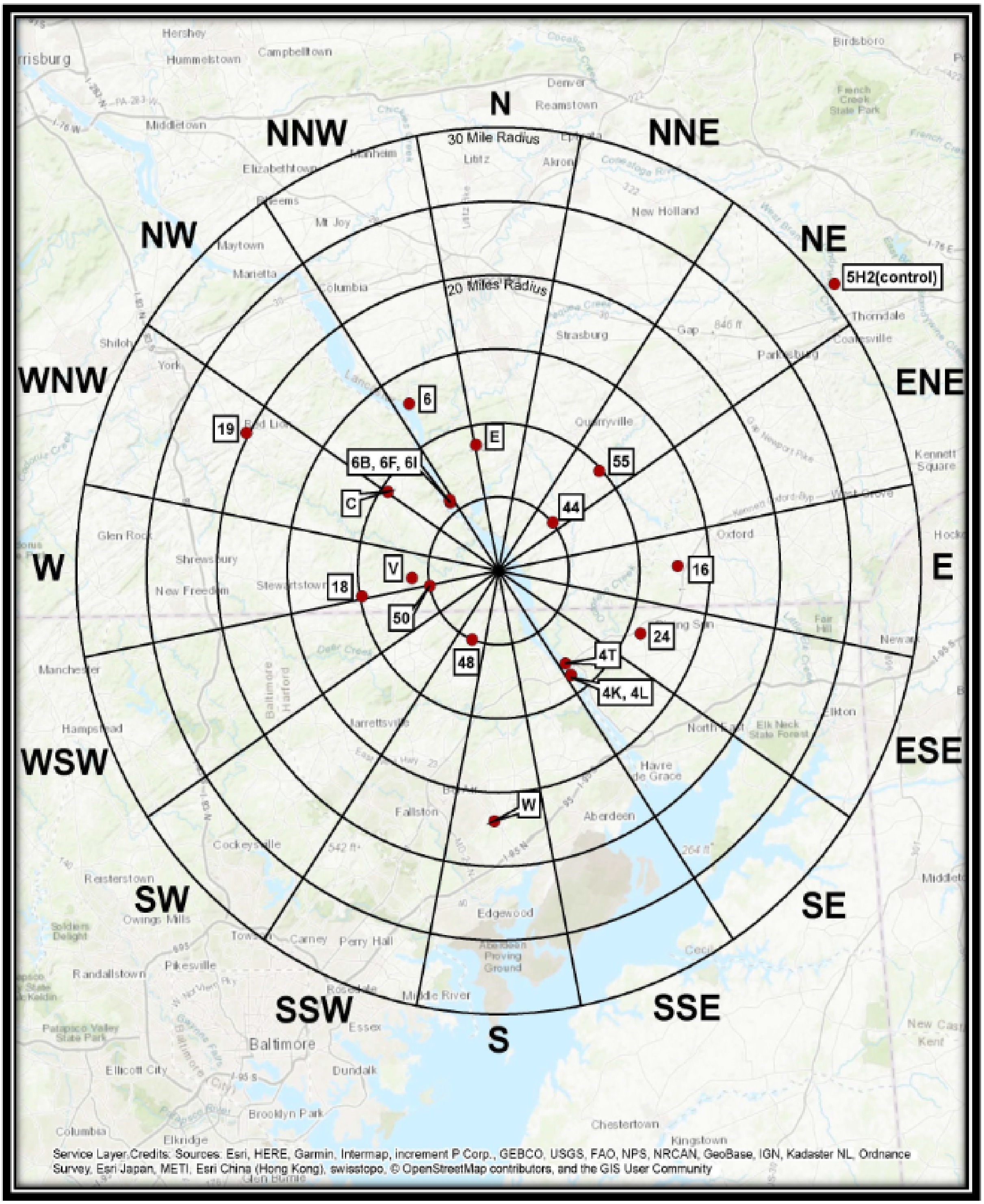


Figure A-4

Gross Beta in Public Water for the Last Ten Years

2013-2022

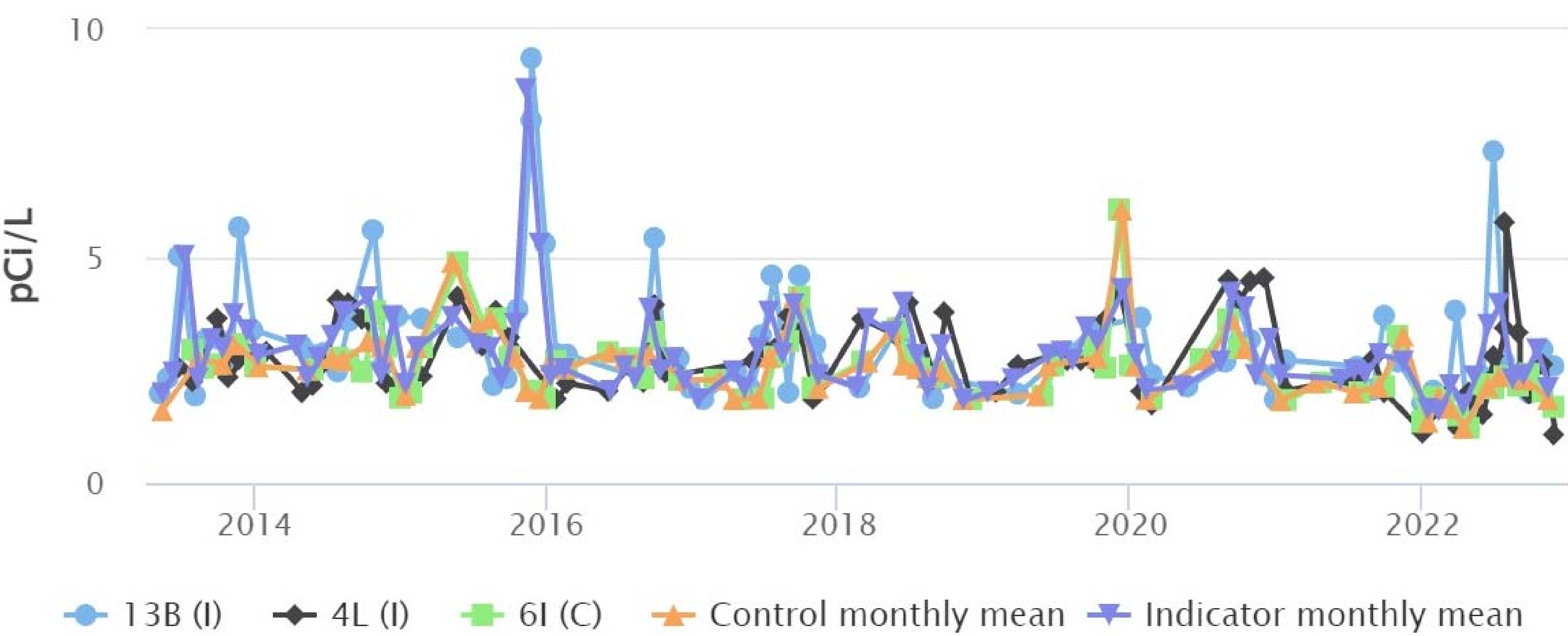
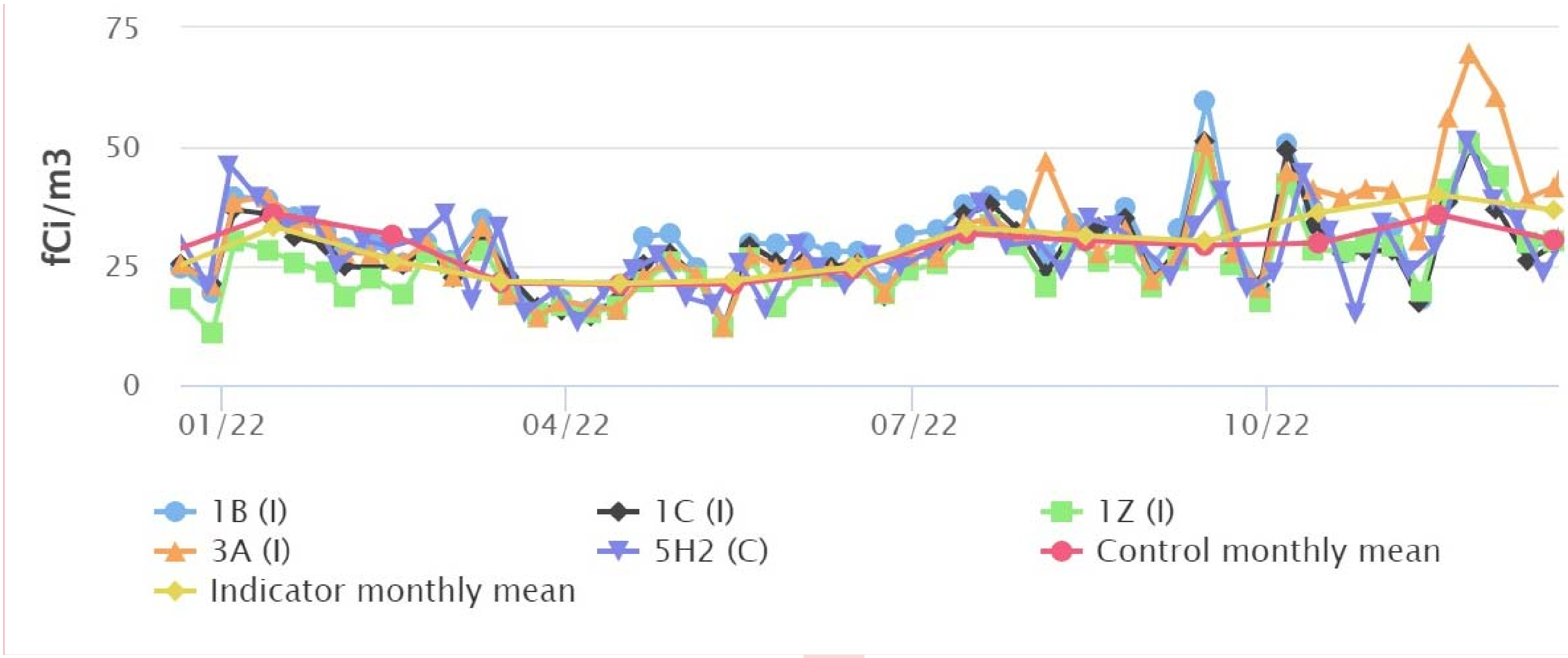


Figure A-5

Gross Beta in Air Samples for 2022



[WEN1]

Figure A-6
Annual Trending of Air Activity (Gross Beta)

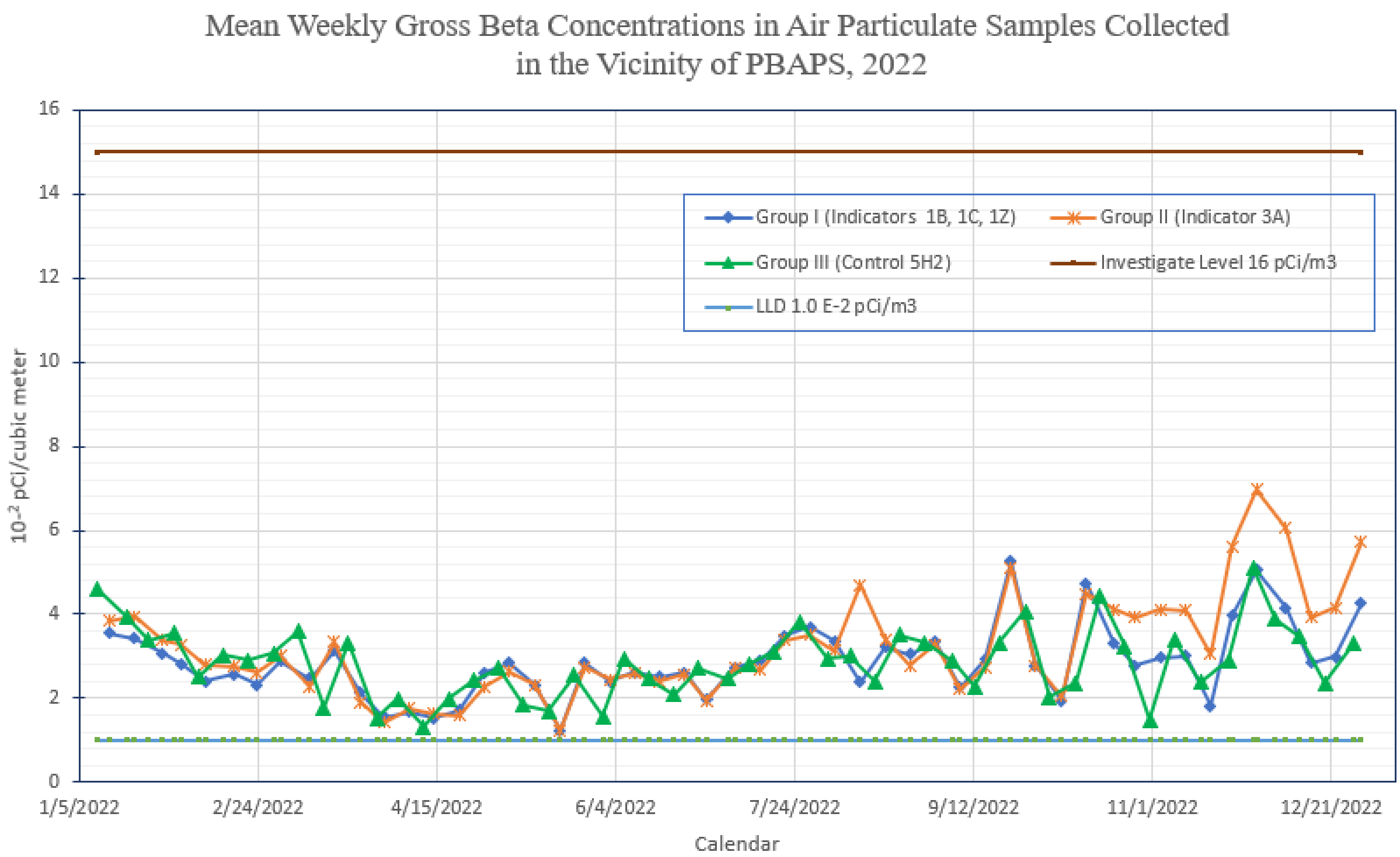


Figure A-7
2022 Monthly Gross Beta Concentrations in Drinking Water, (4L) Split between CGS and TBE

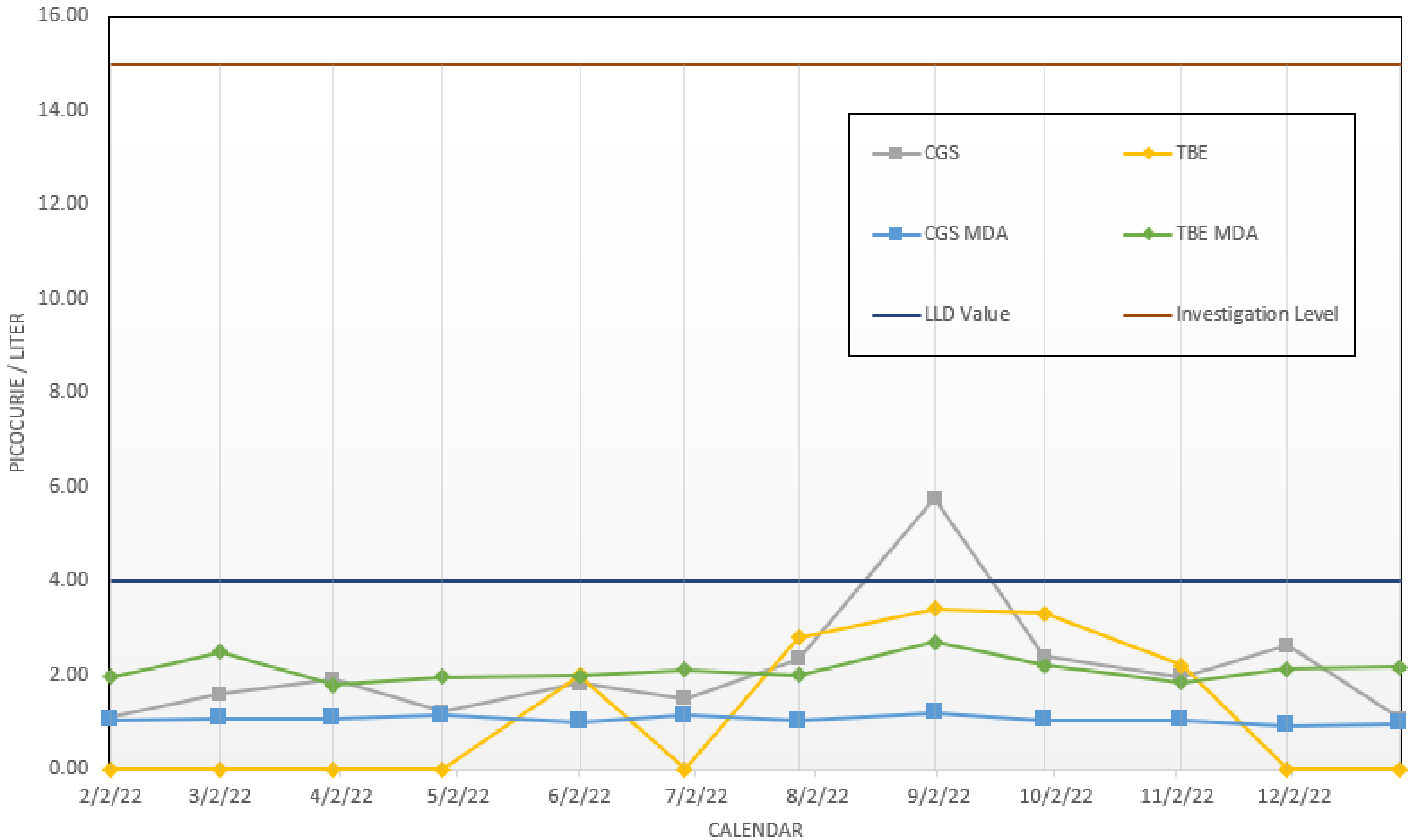


Figure A-8
2022 Weekly Gross Beta Concentrations in Air Particulate Samples from Co-Located Air samplers 1Z and 1A Analyzed by CGS and TBE as 10^{-2}pCi/m^3

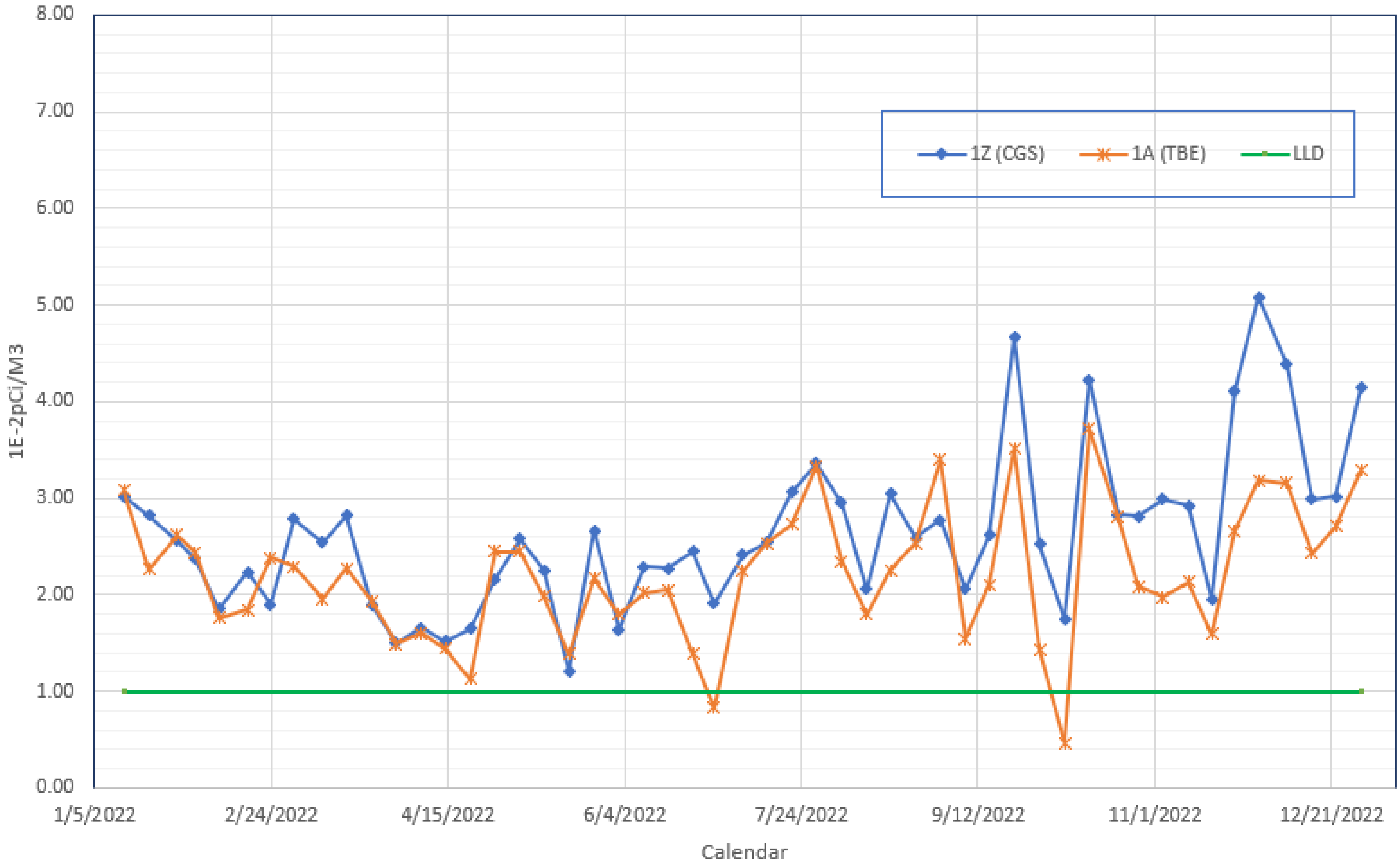
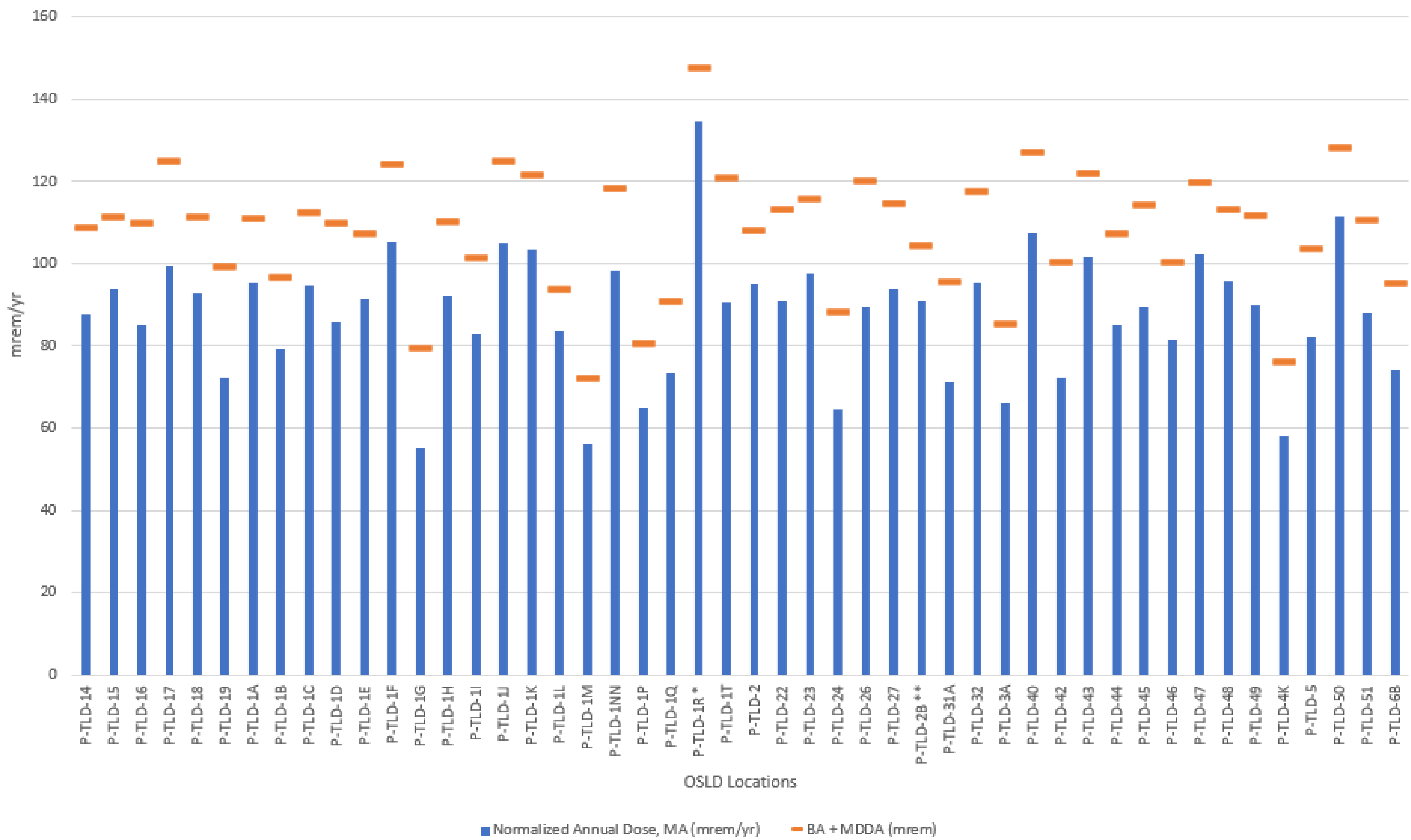


Figure A-9
2022 Annual Normalized Ambient Radiation Results from Dosimeters Collected in the Vicinity of PBAPS
OSLD Results as mrem/year



APPENDIX B

Analysis Results for the REMP

Appendix B is a presentation of the analytical results for the Peach Bottom Atomic Power Station radiological environmental monitoring programs.

TABLE OF CONTENTS - ANALYTICAL RESULTS

Table B-1

Concentration of Gamma Emitters, Tritium, and Gross Beta in Surface and Drinking Water

(Results in units of pCi/L +/- 2σ)

Sample Code	Sample Date	Gamma Emitters	Tritium[2]	Gross Beta[3]
1LL[1]	2/2/2022	*		ND
Units 2 and 3 Intake	3/4/2022	*		ND
Composite	3/30/2022	*	<119	ND
	4/27/2022	*		ND
	6/1/2022	*		ND
	6/29/2022	*	<165	ND
	7/27/2022	*		ND
	8/31/2022	*		ND
	9/28/2022	*	<155	ND
	11/2/2022	*		ND
	11/30/2022	*		ND
	12/28/2022	*	<107	ND
1MM	2/2/2022	*		ND
Canal Discharge	3/4/2022	*		ND
Composite	3/30/2022	*	<122	ND
	4/27/2022	*		ND
	6/1/2022	*		ND
	6/29/2022	*	<168	ND
	7/27/2022	*		ND
	8/31/2022	*		ND
	9/28/2022	*	<152	ND
	11/2/2022	*		ND
	11/30/2022	*		ND
	12/28/2022	*	<107	ND
4L	2/2/2022	*		1.10±0.72
Conowingo Dam	3/2/2022	*		1.60±0.77
Composite	3/31/2022	*	<125	1.91±0.79
	4/28/2022	*		1.21±0.77
	6/2/2022	*		1.83±0.75
	6/29/2022	*	<169	1.51±0.79
	7/28/2022	*		2.34±0.51
	9/1/2022	*		5.76±0.44
	9/29/2022	*	<153	2.41±0.81
	11/3/2022	*		1.97±0.78
	11/30/2022	*		2.62±0.77
	12/29/2022	*	<94.2	1.07±0.66

Table B-1

Concentration of Gamma Emitters, Tritium, and Gross Beta in Surface and Drinking Water

(Results in units of pCi/L +/- 2σ)

Sample Code	Sample Date	Gamma Emitters	Tritium[2]	Gross Beta[3]
6I [1]	2/2/2022	*		1.35±0.73
Holtwood Dam	3/2/2022	*		1.90±0.79
Hydroelectric Station	3/31/2022	*	<122	1.82±0.78
	4/28/2022	*		1.49±0.79
	6/2/2022	*		1.22±0.70
	6/29/2022	*	<177	2.18±0.84
	7/28/2022	*		2.15±0.79
	9/1/2022	*		2.35±0.78
	9/29/2022	*	<154	2.09±0.81
	11/3/2022	*		2.41±0.81
	11/30/2022	*		1.68±0.71
	12/29/2022	*	<98.3	2.02±0.72
13B	1/31/22	*		1.77±0.77
Chester Water Authority	3/1/22	*		2.04±0.80
Composite	3/28/22	*	<124	1.69±0.77
	4/25/22	*		3.81±0.94
	5/31/22	*		1.33±0.71
	6/27/22	*	<170	2.35±1.37
	7/25/22	*		7.32±0.35
	8/29/22	*		2.69±0.90
	9/26/22	*	<156	2.29±0.80
	10/31/22	*		1.99±0.78
	11/28/22	*		2.95±0.79
	12/27/22	*	<89.6	2.58±0.78

[1] Control Location
[2] Tritium result for the quarterly composite
[3] ND, No Data, analysis not required
* All Non-Natural Gamma Emitters <MDA

Table B-2

Concentration of Gamma Emitters in the Flesh of Edible Fish

(Results in units of pCi/kg (wet) +/- 2σ)

Sample Code	Sample Date	Sample Type	Gamma Emitters
4	6/10/2022	Bottom Feeder Fish	*
Conowingo Pond	6/17/2022	Predator Fish	*
	10/11/2022	Bottom Feeder Fish	*
	10/11/2022	Predator Fish	*
6[1]			
Holtwood Pond	6/11/2022	Bottom Feeder Fish	[2]
	6/11/2022	Predator Fish	*
	9/27/2022	Bottom Feeder Fish	*
	10/18/2022	Predator Fish	*

[1] Control Location
[2] Lost Sample
* All Non-Natural Gamma Emitters <MDA

Table B-3

Concentration of Gamma Emitters in Sediment

(Results in units of pCi/kg (wet) +/- 2σ)

Sample Code	Sample Date	Gamma Emitters
4J Conowingo Pond near Berkin's Run	06/14/2022 12/05/2022	* *
4T Conowingo Pond near Conowingo Dam	06/14/2022 12/05/2022	* *
6F[1] Holtwood Dam	06/14/2022 12/05/2022	* *

[1] Control Location
* All Non-Natural Gamma Emitters <MDA

Table B-4
Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Coll Date	End Coll Date	GROUP 1 1B	GROUP 1 1C	GROUP 1 1Z	GROUP II 3A	GROUP III 5H2[1]
1/3/2022	1/10/2022					*
1/4/2022	1/13/2022	*	*	*	*	
1/10/2022	1/18/2022					*
1/13/2022	1/20/2022	*	*	*	*	
1/18/2022	1/24/2022					*
1/20/2022	1/28/2022	*	*	*	*	
1/24/2022	1/31/2022					*
1/28/2022	2/2/2022	*	*	*	*	
1/31/2022	2/7/2022					*
2/2/2022	2/9/2022	*	*	*	*	
2/7/2022	2/14/2022					*
2/9/2022	2/17/2022	*	*	*	*	
2/14/2022	2/21/2022					*
2/17/2022	2/23/2022	*	*	*	*	
2/21/2022	2/28/2022					*
2/23/2022	3/2/2022	*	*	*	*	
2/28/2022	3/7/2022					*
3/2/2022	3/10/2022	*	*	*	*	
3/7/2022	3/14/2022					*
3/10/2022	3/17/2022	*	*	*	*	
3/14/2022	3/21/2022					*
3/17/2022	3/24/2022	*	*	*	*	
3/21/2022	3/29/2022					*
3/24/2022	3/31/2022	*	*	*	*	
3/29/2022	4/4/2022					*
3/31/2022	4/7/2022	*	*	*	*	
4/4/2022	4/11/2022					*
4/7/2022	4/14/2022	*	*	*	*	
4/11/2022	4/18/2022					*
4/14/2022	4/21/2022	*	*	*	*	
4/18/2022	4/25/2022					*
4/21/2022	4/28/2022	*	*	*	*	
4/25/2022	5/2/2022					*
4/28/2022	5/5/2022	*	*	*	*	
5/2/2022	5/9/2022					*
5/5/2022	5/12/2022	*	*	*	*	
5/9/2022	5/16/2022					*
5/12/2022	5/19/2022	*	*	*	*	
5/16/2022	5/23/2022					*

Start Coll Date	End Coll Date	1B	1C	1Z	3A	5H2[1]
5/19/2022	5/26/2022	*	*	*	*	
5/23/2022	5/31/2022					*
5/26/2022	6/2/2022	*	*	*	*	
5/31/2022	6/6/2022					*
6/2/2022	6/9/2022	*	*	*	*	
6/6/2022	6/13/2022					*
6/9/2022	6/16/2022	*	*	*	*	
6/13/2022	6/20/2022					*
6/16/2022	6/23/2022	*	*	*	*	
6/20/2022	6/27/2022					*
6/23/2022	6/29/2022	*	*	*	*	
6/27/2022	7/5/2022					*
6/29/2022	7/7/2022	*	*	*	*	
7/5/2022	7/11/2022					*
7/7/2022	7/14/2022	*	*	*	*	
7/11/2022	7/18/2022					*
7/14/2022	7/21/2022	*	*	*	*	
7/18/2022	7/25/2022					*
7/21/2022	7/28/2022	*	*	*	*	
7/25/2022	8/2/2022					*
7/28/2022	8/4/2022	*	*	*	*	
8/2/2022	8/8/2022					*
8/4/2022	8/11/2022	*	*	*	[2]	
8/8/2022	8/15/2022					*
8/11/2022	8/18/2022	*	*	*	*	
8/15/2022	8/22/2022					*
8/18/2022	8/25/2022	*	*	*	*	
8/22/2022	8/29/2022					*
8/25/2022	9/1/2022	*	*	*	*	
8/29/2022	9/6/2022					*
9/1/2022	9/8/2022	*	*	*	*	
9/6/2022	9/12/2022					*
9/8/2022	9/15/2022	*	*	*	*	
9/12/2022	9/19/2022					*
9/15/2022	9/22/2022	*	*	*	*	
9/19/2022	9/26/2022					*
9/22/2022	9/29/2022	*	*	*	*	

Start Coll Date	End Coll Date	1B	1C	1Z	3A	5H2[1]
09/26/2022	10/03/2022					*
9/29/2022	10/6/2022	*	*	*	*	
10/3/2022	10/10/2022					*
10/6/2022	10/13/2022	*	*	*	*	
10/10/2022	10/17/2022					*
10/13/2022	10/21/2022	*	*	*	*	
10/17/2022	10/24/2022					*
10/21/2022	10/27/2022	*	*	*	*	
10/24/2022	10/31/2022					*
10/27/2022	11/3/2022	*	*	*	*	
10/31/2022	11/7/2022					*
11/3/2022	11/10/2022	*	*	*	*	
11/7/2022	11/14/2022					*
11/10/2022	11/17/2022	*	*	*	*	
11/14/2022	11/22/2022					*
11/17/2022	11/23/2022	*	*	*	*	
11/22/2022	11/29/2022					*
11/23/2022	11/30/2022	*	*	*	*	
11/29/2022	12/5/2022					*
11/30/2022	12/8/2022	*	*	*	*	
12/5/2022	12/12/2022					*
12/8/2022	12/15/2022	*	*	*	*	
12/12/2022	12/19/2022					*
12/15/2022	12/22/2022	*	*	*	*	
12/19/2022	12/27/2022					*
12/22/2022	12/29/2022	*	*	*	*	

[1] Control Location
[2] Lost Sample- power failure
* <MDA (I-131)

Table B-5
Concentration of Beta Emitters in Air Particulates
(Results in units of 10^{-2} pCi/m^3 +/- 2σ)

Start Date	End Date	1B	1C	1Z	3A	5H2 [1]
1/3/2022	1/10/2022					4.59 ± 0.29
1/4/2022	1/13/2022	3.95 ± 0.24	3.68 ± 0.23	3.02 ± 0.22	3.85 ± 0.23	
1/10/2022	1/18/2022					3.94 ± 0.26
1/13/2022	1/20/2022	3.90 ± 0.27	3.59 ± 0.26	2.82 ± 0.24	3.95 ± 0.27	
1/18/2022	1/24/2022					3.38 ± 0.27
1/20/2022	1/28/2022	3.53 ± 0.24	3.11 ± 0.23	2.56 ± 0.22	3.39 ± 0.24	
1/24/2022	1/31/2022					3.54 ± 0.26
1/28/2022	2/2/2022	3.19 ± 0.31	2.93 ± 0.30	2.37 ± 0.28	3.27 ± 0.31	
1/31/2022	2/7/2022					2.51 ± 0.23
2/2/2022	2/9/2022	2.89 ± 0.25	2.49 ± 0.24	1.85 ± 0.22	2.79 ± 0.25	
2/7/2022	2/14/2022					3.03 ± 0.24
2/9/2022	2/17/2022	2.99 ± 0.22	2.46 ± 0.21	2.24 ± 0.20	2.75 ± 0.22	
2/14/2022	2/21/2022					2.91 ± 0.24
2/17/2022	2/23/2022	2.56 ± 0.27	2.52 ± 0.27	1.90 ± 0.23	2.60 ± 0.26	
2/21/2022	2/28/2022					3.07 ± 0.24
2/23/2022	3/2/2022	3.00 ± 0.26	2.87 ± 0.25	2.78 ± 0.25	3.01 ± 0.26	
2/28/2022	3/7/2022					3.59 ± 0.27
3/2/2022	3/10/2022	2.61 ± 0.22	2.25 ± 0.20	2.54 ± 0.27	2.28 ± 0.20	
3/7/2022	3/14/2022					1.77 ± 0.20
3/10/2022	3/17/2022	3.49 ± 0.27	3.10 ± 0.26	2.82 ± 0.31	3.33 ± 0.26	
3/14/2022	3/21/2022					3.31 ± 0.25
3/17/2022	3/24/2022	2.21 ± 0.23	2.26 ± 0.25	1.90 ± 0.21	1.90 ± 0.20	
3/21/2022	3/29/2022					1.52 ± 0.18
3/24/2022	3/31/2022	1.48 ± 0.20	1.63 ± 0.21	1.50 ± 0.20	1.43 ± 0.20	
3/29/2022	4/4/2022					1.99 ± 0.24
3/31/2022	4/7/2022	1.80 ± 0.20	1.56 ± 0.19	1.66 ± 0.19	1.76 ± 0.20	
4/4/2022	4/11/2022					1.31 ± 0.19
4/7/2022	4/14/2022	1.59 ± 0.20	1.44 ± 0.20	1.52 ± 0.20	1.63 ± 0.20	
4/11/2022	4/18/2022					1.98 ± 0.20
4/14/2022	4/21/2022	1.72 ± 0.22	1.78 ± 0.22	1.65 ± 0.20	1.58 ± 0.20	
4/18/2022	4/25/2022					2.41 ± 0.23
4/21/2022	4/28/2022	3.11 ± 0.25	2.53 ± 0.23	2.16 ± 0.22	2.28 ± 0.23	
4/25/2022	5/2/2022					2.71 ± 0.23
4/28/2022	5/5/2022	3.18 ± 0.25	2.76 ± 0.24	2.58 ± 0.23	2.64 ± 0.24	
5/2/2022	5/9/2022					1.83 ± 0.21
5/5/2022	5/12/2022	2.46 ± 0.22	2.23 ± 0.22	2.25 ± 0.24	2.32 ± 0.22	
5/9/2022	5/16/2022					1.68 ± 0.20
5/12/2022	5/19/2022	1.26 ± 0.18	1.21 ± 0.19	1.21 ± 0.20	1.23 ± 0.19	

Start Date	End Date	1B	1C	1Z	3A	5H2 [1]
5/16/2022	5/23/2022					2.55 ± 0.23
5/19/2022	5/26/2022	2.97 ± 0.23	2.92 ± 0.25	2.66 ± 0.26	2.74 ± 0.24	
5/23/2022	5/31/2022					1.58 ± 0.18
5/26/2022	6/2/2022	2.96 ± 0.24	2.58 ± 0.23	1.64 ± 0.31	2.45 ± 0.23	
5/31/2022	6/6/2022					2.94 ± 0.20
6/2/2022	6/9/2022	2.99 ± 0.25	2.57 ± 0.24	2.29 ± 0.24	2.59 ± 0.23	
6/6/2022	6/13/2022					2.46 ± 0.26
6/9/2022	6/16/2022	2.79 ± 0.26	2.48 ± 0.24	2.27 ± 0.23	2.40 ± 0.25	
6/13/2022	6/20/2022					2.09 ± 0.26
6/16/2022	6/23/2022	2.81 ± 0.23	2.56 ± 0.23	2.45 ± 0.22	2.56 ± 0.23	
6/20/2022	6/27/2022					2.71 ± 0.18
6/23/2022	6/29/2022	2.13 ± 0.31	1.86 ± 0.33	1.91 ± 0.32	1.94 ± 0.33	
6/27/2022	7/5/2022					2.47 ± 0.21
6/29/2022	7/7/2022	3.16 ± 0.15	2.62 ± 0.15	2.41 ± 0.17	2.71 ± 0.16	
7/5/2022	7/11/2022					2.82 ± 0.22
7/7/2022	7/14/2022	3.26 ± 0.25	2.84 ± 0.24	2.54 ± 0.23	2.68 ± 0.27	
7/11/2022	7/18/2022					3.12 ± 0.23
7/14/2022	7/21/2022	3.79 ± 0.22	3.59 ± 0.22	3.06 ± 0.21	3.39 ± 0.22	
7/18/2022	7/25/2022					3.82 ± 0.22
7/21/2022	7/28/2022	3.96 ± 0.25	3.79 ± 0.26	3.36 ± 0.24	3.50 ± 0.25	
7/25/2022	8/2/2022					2.94 ± 0.29
7/28/2022	8/4/2022	3.89 ± 0.28	3.23 ± 0.31	2.95 ± 0.29	3.13 ± 0.30	
8/2/2022	8/8/2022					3.01 ± 0.26
8/4/2022	8/11/2022	2.74 ± 0.35	2.34 ± 0.34	2.06 ± 0.33	[2]	
8/8/2022	8/15/2022					2.40 ± 0.29
8/11/2022	8/18/2022	3.39 ± 0.21	3.22 ± 0.19	3.04 ± 0.19	3.40 ± 0.29	
8/15/2022	8/22/2022					3.50 ± 0.24
8/18/2022	8/25/2022	3.25 ± 0.23	3.31 ± 0.26	2.59 ± 0.23	2.77 ± 0.21	
8/22/2022	8/29/2022					3.33 ± 0.21
8/25/2022	9/1/2022	3.73 ± 0.21	3.50 ± 0.22	2.77 ± 0.19	3.27 ± 0.20	
8/29/2022	9/6/2022					2.89 ± 0.26
9/1/2022	9/8/2022	2.52 ± 0.36	2.20 ± 0.38	2.06 ± 0.32	2.21 ± 0.35	
9/6/2022	9/12/2022					2.28 ± 0.25
9/8/2022	9/15/2022	3.28 ± 0.25	2.89 ± 0.25	2.62 ± 0.24	2.74 ± 0.23	
9/12/2022	9/19/2022					3.33 ± 0.26
9/15/2022	9/22/2022	5.97 ± 0.33	5.12 ± 0.33	4.66 ± 0.30	5.11 ± 0.31	
9/19/2022	9/26/2022					4.07 ± 0.27
9/22/2022	9/29/2022	3.12 ± 0.25	2.68 ± 0.25	2.52 ± 0.24	2.78 ± 0.24	
9/26/2022	10/3/2022					2.03 ± 0.22
9/29/2022	10/6/2022	1.98 ± 0.21	2.10 ± 0.21	1.75 ± 0.20	2.05 ± 0.21	
10/3/2022	10/10/2022					2.35 ± 0.22
10/6/2022	10/13/2022	5.07 ± 0.31	4.93 ± 0.31	4.23 ± 0.29	4.49 ± 0.29	

Start Date	End Date	1B	1C	1Z	3A	5H2[1]
10/10/2022	10/17/2022					4.44 ± 0.30
10/13/2022	10/21/2022	3.70 ± 0.24	3.36 ± 0.25	2.83 ± 0.23	4.11 ± 0.27	
10/17/2022	10/24/2022					3.23 ± 0.25
10/21/2022	10/27/2022	2.77 ± 0.26	2.76 ± 0.23	2.81 ± 0.27	3.93 ± 0.30	
10/24/2022	10/31/2022					1.49 ± 0.19
10/27/2022	11/3/2022	3.06 ± 0.25	2.82 ± 0.24	2.99 ± 0.26	4.12 ± 0.28	
10/31/2022	11/7/2022					3.40 ± 0.25
11/3/2022	11/10/2022	3.30 ± 0.25	2.82 ± 0.24	2.92 ± 0.24	4.09 ± 0.28	
11/7/2022	11/14/2022					2.39 ± 0.22
11/10/2022	11/17/2022	1.79 ± 0.22	1.73 ± 0.21	1.96 ± 0.22	3.04 ± 0.25	
11/14/2022	11/22/2022					2.91 ± 0.22
11/17/2022	11/23/2022	3.92 ± 0.30	3.84 ± 0.29	4.11 ± 0.30	5.62 ± 0.34	
11/22/2022	11/29/2022					5.12 ± 0.30
11/23/2022	11/30/2022	5.06 ± 0.30	5.04 ± 0.32	5.08 ± 0.30	6.97 ± 0.34	
11/29/2022	12/5/2022					3.88 ± 0.30
11/30/2022	12/8/2022	4.39 ± 0.26	3.68 ± 0.25	4.38 ± 0.27	6.06 ± 0.30	
12/5/2022	12/12/2022					3.46 ± 0.26
12/8/2022	12/15/2022	2.91 ± 0.24	2.61 ± 0.23	2.99 ± 0.24	3.93 ± 0.27	
12/12/2022	12/19/2022					2.35 ± 0.22
12/15/2022	12/22/2022	3.01 ± 0.25	2.95 ± 0.26	3.02 ± 0.25	4.16 ± 0.28	
12/19/2022	12/27/2022					3.32 ± 0.23
12/22/2022	12/29/2022	4.28 ± 0.28	4.37 ± 0.28	4.14 ± 0.27	5.71 ± 0.31	

[1] Control Location
[2] Lost Sample-Air Sampler Malfunction

Table B-6

Concentration of Gamma Emitters in Air Particulates

(Results in units of 10^{-3} pCi/m^3 +/- 2σ)

Start Date	Stop Date	1B	1C	1Z	3A	5H2[1]
1/03/2022	3/29/2022					*
1/04/2022	3/31/2022	*	*	*	*	
3/29/2022	6/27/2022					*
3/31/2022	6/29/2022	*	*	*	*	
6/27/2022	9/26/2022					*
6/29/2022	9/29/2022	*	*	*	*	
9/26/2022	12/27/2022					*
9/29/2022	12/29/2022	*	*	*	*	

[1] Control Location
* All Non-Natural Gamma Emitters <MDA

Table B-7

Concentration of Gamma Emitters in Vegetation Samples

(Results in units of pCi/kg (wet) +/- 2σ)

Sample Code	Sample Date	Sample Type	Gamma Emitters
1C	6/22/2022	Kale	*
	6/22/2022	Collard	*
	6/22/2022	Cabbage	*
	7/20/2022	Collard	*
	7/20/2022	Cabbage	*
	7/20/2022	Kale	*
	8/17/2022	Kale	*
	8/17/2022	Collard	*
	8/17/2022	Cabbage	*
	9/20/2022	Kale	*
	9/20/2022	Collard	*
	9/20/2022	Chard	*
2Q	6/22/2022	Cabbage	*
	6/22/2022	Cucumber	*
	6/22/2022	String Beans	*
	7/20/2022	Zucchini	*
	7/20/2022	Yellow Squash	*
	7/20/2022	Cabbage	*
	8/17/2022	Broccoli	*
	8/17/2022	Zucchini	*
	8/17/2022	Cabbage	*
	9/20/2022	Cabbage	*
	9/20/2022	Broccoli	*
	9/20/2022	Pumpkin Leaves	*
3Q	6/22/2022	Cabbage	*
	6/22/2022	Broccoli	*
	6/22/2022	Kale	*
	7/20/2022	Cauliflower	*
	7/20/2022	Cabbage	*
	7/20/2022	Broccoli	*
	8/17/2022	Beets	*
	8/17/2022	Squash	*
	8/17/2022	Eggplant	*
	9/20/2022	Pumpkin	*
	9/20/2022	Zucchini	*
	9/20/2022	Eggplant	*

Table B-7

Concentration of Gamma Emitters in Vegetation Samples

(Results in units of pCi/kg (wet) +/- 2σ)

Sample Code	Sample Date	Sample Type	Gamma Emitters
55[1]	6/22/2022	Kale	*
	6/22/2022	Cabbage	*
	6/22/2022	Collards	*
	7/20/2022	Kale	*
	7/20/2022	Cabbage	*
	7/20/2022	Collards	*
	8/17/2022	Kale	*
	8/17/2022	Cabbage	*
	8/17/2022	Collards	*
	9/20/2022	Pumpkin	*
	9/20/2022	Zucchini	*
	9/20/2022	Swiss Chard	*

[1] Control Location
* All Non-Natural Gamma Emitters <MDA

Table B-8
Concentration of Gamma Emitters (including I-131) in Milk
(Results in units of pCi/Liter +/- 2σ)

Sample Code	Sample Date	Gamma Emitters
Farm J	1/6/2022	*
Biweekly-Monthly	2/9/2022	*
	3/2/2022	*
	4/12/2022	*
	4/26/2022	*
	5/10/2022	*
	5/24/2022	*
	6/7/2022	*
	6/21/2022	*
	7/6/2022	*
	7/20/2022	*
	8/2/2022	*
	8/16/2022	*
	8/30/2022	*
	9/14/2022	*
	9/27/2022	*
	10/12/2022	*
	10/25/2022	*
	11/8/2022	*
	11/22/2022	*
	12/6/2022	*
Farm R	1/6/2022	*
Biweekly-Monthly	2/8/2022	*
	3/2/2022	*
	4/12/2022	*
	4/26/2022	*
	5/10/2022	*
	5/24/2022	*
	6/7/2022	*
	6/21/2022	*
	7/6/2022	*
	7/20/2022	*
	8/2/2022	*
	8/16/2022	*
	8/30/2022	*
	9/14/2022	*
	9/27/2022	*
	10/12/2022	*
	10/25/2022	*
	11/8/2022	*
	11/22/2022	*
	12/8/2022	*

Table B-8
Concentration of Gamma Emitters (including I-131) in Milk
(Results in units of pCi/Liter +/- 2σ)

Sample Code	Sample Date	Gamma Emitters
Farm S	1/6/2022	*
Biweekly-Monthly	2/8/2022	*
	3/2/2022	*
	4/12/2022	*
	4/26/2022	*
	5/10/2022	*
	5/24/2022	*
	6/7/2022	*
	6/21/2022	*
	7/6/2022	*
	7/20/2022	*
	8/2/2022	*
	8/16/2022	*
	8/30/2022	*
	9/14/2022	*
	9/27/2022	*
	10/12/2022	*
	10/25/2022	*
	11/8/2022	*
	11/22/2022	*
	12/6/2022	*
Farm V	1/6/2022	*
Biweekly-Monthly	2/8/2022	*
	3/2/2022	*
	4/12/2022	*
	4/26/2022	*
	5/10/2022	*
	5/24/2022	*
	6/7/2022	*
	6/21/2022	*
	7/6/2022	*
	7/20/2022	*
	8/2/2022	*
	8/16/2022	*
	8/30/2022	*
	9/14/2022	*
	9/27/2022	*
	10/12/2022	*
	10/25/2022	*
	11/9/2022	*
	11/21/2022	*
	12/7/2022	*

Table B-8
Concentration of Gamma Emitters (including I-131) in Milk
(Results in units of pCi/Liter +/- 2σ)

Sample Code	Sample Date	Gamma Emitters
Farm X	1/6/2022	*
Biweekly-Monthly	2/8/2022	*
	3/2/2022	*
	4/12/2022	*
	4/26/2022	*
	5/10/2022	*
	5/24/2022	*
	6/7/2022	*
	6/21/2022	*
	7/6/2022	*
	7/20/2022	*
	8/2/2022	*
	8/16/2022	*
	8/30/2022	*
	9/14/2022	*
	9/27/2022	*
	10/12/2022	*
	10/25/2022	*
	11/8/2022	*
	11/22/2022	*
	12/7/2022	*
Farm C	2/8/2022	*
Quarterly	5/11/2022	*
	8/3/2022	*
	11/8/2022	*
Farm D	2/8/2022	*
Quarterly	5/10/2022	*
	8/2/2022	*
	11/8/2022	*
Farm E	2/9/2022	*
Quarterly	5/10/2022	*
	8/2/2022	*
	11/8/2022	*
Farm P	2/8/2022	*
Quarterly	5/10/2022	*
	8/2/2022	*
	11/8/2022	*

Table B-8
Concentration of Gamma Emitters (including I-131) in Milk
(Results in units of pCi/Liter +/- 2σ)

Sample Code	Sample Date	Gamma Emitters
Farm W Quarterly	2/8/2022	*
	5/10/2022	*
	8/4/2022	*
	11/8/2022	*
Farm Y Quarterly	2/9/2022	*
	5/10/2022	*
	8/2/2022	*
	11/8/2022	*

[1] Control Location
* All Non-Natural Gamma Emitters <MDA

Table B-9

Typical MDA Ranges for Gamma Spectrometry

Selected Nuclides	Air Particulates (10^{-3} pCi/m^3)	Surface Water, Drinking Water (pCi/L)	Fish (pCi/kg) Wet	Ground water (pCi/L)	Milk (pCi/L)	Oysters (pCi/kg)	Shoreline Sediment (pCi/kg)Dry	Soil (pCi/kg) Dry	Vegetation (pCi/kg) Wet
K-40	5.65 - 24.6	16 - 182	2,747 - 4,505	21.5 -66.4	1,286 - 1,529	1,269 - 2,069	781 - 13,761	789 - 10,713	671 - 11,829
Mn-54	0.32 - 1.16	2.7 - 5.6	9.8 - 19.6	2.86 - 5.14	3.6 - 6.6	10.8 - 16.4	41.4 - 67.1	37.4 - 91.9	10.3 - 53.0
Fe-59	1.01 - 8.52	5.6 - 13.2	31.6 - 93.2	6.04 - 11.7	9.2 - 15.9	29.3 - 56.7	142 - 251	96.4 – 389	22.0 - 151
Co-58	0.38 - 2.07	2.7 - 5.6	10.9 - 28.3	2.86 - 5.27	3.7 - 6.3	10.5 - 19.3	53.7 - 82.9	44.6 – 133	10.9 - 59.8
Co-60	0.28 - 1.09	2.8 - 5.5	10.9 - 24.3	3.01 - 5.38	4.1 - 7.2	11.7 - 17.0	38.6 - 57.9	32.8 - 85.8	12.9 - 55.0
Zn-65	0.81 - 3.10	5.5 - 11.4	23.3 - 57.2	6.41 - 14.4	9.4 - 16.1	22.0 - 43.3	112 - 198	96.4 – 275	24.7 - 116
Ag-110m	0.33 – 1.06	2.42 - 4.96	8.2 – 18.1	2.79 - 5.06	3.26- 5.64	8.7 - 16.0	36.6 - 175	40.7 – 99.4	10.1 - 61.4
Zr-95	0.72 - 3.88	4.7 - 10.2	20.0 - 47.1	5.62 - 8.75	5.8 - 11.5	19.0 - 34.0	93.5 - 151	84.6 – 261	19.3 - 116
Nb-95	0.56 - 4.91	2.9 - 6.0	13.7 - 42.7	3.3 - 5.88	3.9 - 6.5	13.9 - 24.3	82.1 - 157	61.5 – 227	10.9 - 90.5
Ru-106	3.00 - 12.1	23.8 - 48.1	77.1 - 197	25.6 - 45.3	29.3 - 51.8	88.0 - 141	327.0 – 570	314.0 – 840	92.9 - 541
I-131[1]	2.73 - 914	0.52 - 11.7	21.4 - 2,340	4.87 - 9.04	0.5 - 7.03	22.4 - 107	470 - 2,040	139 - 8,060	13.4 - 854
Cs-134	0.47 - 0.88	3.2 - 5.7	7.8 - 16.0	2.92 - 5.48	4.09 - 4.82	9.7 - 16.5	43.3 - 82.4	33.4 - 109	11.1 - 58.1
Cs-137	0.46 - 0.88	3.7 - 5.9	3.8 - 17.5	2.97 - 5.43	4.08 - 5.29	10.0 - 16.7	38.4 - 65.4	39.1 - 135	11.1 - 62.3
La-140	2.01 – 116	5.05 - 11.5	15.9 - 444	4.87 - 10.3	4.89 - 6.28	24.1 - 80.4	368 - 773	136 - 1,820	9.1 - 388
Ba-140	2.01 - 116	5.05 - 11.5	15.9 - 444	5.86 - 26.0	4.89 - 6.28	24.1 - 80.4	368 – 773	136 - 1,820	9.1 - 388
Ce-144	1.12 - 3.27	16.8 - 36.7	38.1 - 70.9	17.8 - 32.0	20.5 - 31.0	42.6 - 72.6	208 - 279	191 - 414	46.6 - 289
Cr-51	4.90 - 45.0	23.2 - 50.6	93.0 - 395	26.7 - 42.1	30.4 - 46.8	97.0 - 199	711 - 1,110	489 - 1,810	93.9 - 850
Na-22	0.34 - 1.33	2.7 - 6.0	12.1 - 28.0	2.78 - 5.94	4.9 - 8.5	13.4 - 19.5	46.4 - 77.4	36.4 - 92.4	8.9 - 54.1

[1] This MDA range for I-131 on a charcoal cartridge is typically 5.22×10^{-3} to 1.37×10^{-2} pCi/m^3

Table B-10

Typical LLDs for Gamma Spectrometry

Selected Nuclides	Air Particulates 10-3 pCi/m3	Surface Water, Drinking Water pCi/L	Fish pCi/kg (wet)	Ground water pCi/L	Oysters pCi/kg (wet)	Milk pCi/L	Soil pCi/kg (dry)	Vegetation pCi/kg (wet)
Na-22	5	5.3	12	5.3	12	9.1	78	27
Cr-51	74	37	76	37	76	62	452	174
Mn-54	4.6	4.7	13	4.7	13	7.4	63	19
Co-58	6.7	4.3	12	4.3	12	8.2	78	23
Fe-59	20	11	27	11	27	18	123	57
Co-60	3.5	4.8	12	4.8	12	7.5	59	24
Zn-65	8.9	11	27	11	27	17	162	55
Nb-95	9.8	4.5	13	4.5	13	9.5	73	25
Zr-95	11	7.9	18	7.9	18	14	117	34
Ru-106	43	38	111	38	111	62	624	174
Ag-110m	4.2	4.3	11	4.3	11	6	65	20
Te-129m	101	56	118	56	118	90	833	263
I-131*	90	0.8	11	6.4	11	0.8	58	42
Cs-134	4.7	4.7	11	4.7	11	6.7	66	18
Cs-137	4.2	5.1	11	5.1	11	6.9	78	21
Ba-140	47	23	39	23	39	46	103	111
La-140	47	9.2	15	9.2	15	13	103	30
Ce-144	15	23	45	23	45	37	288	70

* The LLD for I-131 measured on a Charcoal cartridge is 3.7×10^{-2} pCi/m^3

Table B-11
Quarterly DLR Results for Peach Bottom Atomic Power Station 2022
(Results in Units of mrem/91 days)

Monitoring Location	Location Quarterly Baseline, B_Q (mrem)	B_Q + MDD_Q (mrem)	2022 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	21.3	23.8	22.6	20.1	ND	ND	ND	ND
P-TLD-15	23.9	29.3	21.7	24.5	23.2	24.6	ND	ND	ND	ND
P-TLD-16	23.4	28.8	19.7	22.3	21.3	21.8	ND	ND	ND	ND
P-TLD-17	27.2	32.6	23.5	27.2	24.2	24.5	ND	ND	ND	ND
P-TLD-18	23.9	29.3	21.7	23.6	23.9	23.5	ND	ND	ND	ND
P-TLD-19	20.8	26.2	16.5	19.1	16.7	20	ND	ND	ND	ND
P-TLD-1A	23.8	29.2	22.9	26.4	22.6	23.5	ND	ND	ND	ND
P-TLD-1B	20.2	25.6	18.3	20.6	20.2	20	ND	ND	ND	ND
P-TLD-1C	24.1	29.5	21.1	24.9	24.1	24.4	ND	ND	ND	ND
P-TLD-1D	23.4	28.8	19.7	22.8	21.3	22	ND	ND	ND	ND
P-TLD-1E	22.8	28.2	20.6	24	23.1	23.5	ND	ND	ND	ND
P-TLD-1F	27	32.4	26.2	26.7	26.3	26.1	ND	ND	ND	ND
P-TLD-1G	15.9	21.3	12.2	14.8	14.6	13.4	ND	ND	ND	ND
P-TLD-1H	23.6	29.0	21.8	24	22.8	23.4	ND	ND	ND	ND
P-TLD-1I	21.4	26.8	19.2	21.7	20.1	21.9	ND	ND	ND	ND
P-TLD-1J	27.3	32.7	25.2	27	24.1	28.6	ND	ND	ND	ND
P-TLD-1K	26.4	31.8	23.1	27.4	27.1	25.7	ND	ND	ND	ND
P-TLD-1L	19.4	24.8	20	23.1	19.6	21	ND	ND	ND	ND
P-TLD-1M	14	19.4	12.8	14.4	14	14.9	ND	ND	ND	ND
P-TLD-1NN	25.5	30.9	21.8	26.6	23	26.8	ND	ND	ND	ND
P-TLD-1P	16.1	21.5	14.9	18.1	15	17.1	ND	ND	ND	ND
P-TLD-1Q	18.7	24.1	17.3	19.5	17.5	19	ND	ND	ND	ND
P-TLD-1R *	32.9	38.3	30.7	35.6	33.1	35.3	ND	ND	ND	ND
P-TLD-1T	24.7	30.1	19.5	24.4	24	22.8	ND	ND	ND	ND
P-TLD-2	23	28.4	21.5	24.4	24.4	24.6	ND	ND	ND	ND
P-TLD-22	24.3	29.7	21.5	23.9	22.5	23.2	ND	ND	ND	ND
P-TLD-23	24.9	30.3	23.7	25.5	25.2	23.2	ND	ND	ND	ND
P-TLD-24	18.1	23.5	13.7	16	16.3	18.5	ND	ND	ND	ND
P-TLD-26	26	31.4	20.3	23.5	22.9	22.8	ND	ND	ND	ND
P-TLD-27	24.7	30.1	21.9	25.1	21.8	25	ND	ND	ND	ND
P-TLD-2B **	22.1	27.5	21.9	23.7	22	23.4	ND	ND	ND	ND
P-TLD-31A	19.9	25.3	17.5	19.1	18.5	16.1	ND	ND	ND	ND
P-TLD-32	25.4	30.8	21.2	25.2	23.5	25.6	ND	ND	ND	ND
P-TLD-3A	17.3	22.7	15.6	17.8	14.9	17.8	ND	ND	ND	ND
P-TLD-40	27.8	33.2	24.9	28.8	25.5	28.2	ND	ND	ND	ND
P-TLD-42	21	26.4	15.8	19.4	18.9	18.2	ND	ND	ND	ND
P-TLD-43	26.5	31.9	23.5	27	24.6	26.3	ND	ND	ND	ND
P-TLD-44	22.8	28.2	20.3	22.9	22.2	19.7	ND	ND	ND	ND
P-TLD-45	24.5	29.9	21.4	23.2	21.2	23.6	ND	ND	ND	ND
P-TLD-46	21	26.4	18.6	21.7	19.9	21.1	ND	ND	ND	ND
P-TLD-47	26	31.4	24.7	27	24.4	26.1	ND	ND	ND	ND
P-TLD-48	24.3	29.7	21.2	25	23.7	25.7	ND	ND	ND	ND
P-TLD-49	24	29.4	20.7	24.4	24.1	20.5	ND	ND	ND	ND
P-TLD-4K	15.1	20.5	12.9	16	14.7	14.4	ND	ND	ND	ND
P-TLD-5	22	27.4	19.1	23	19.9	20.1	ND	ND	ND	ND
P-TLD-50	28.1	33.5	25.3	27.7	29.3	29.3	ND	ND	ND	ND
P-TLD-51	23.6	29.0	20.7	22.8	22.6	22	ND	ND	ND	ND
P-TLD-6B	19.8	25.2	17.6	20	17.9	18.5	ND	ND	ND	ND

ND Facility Related Dose was Not Detected
* 1R is the dosimeter closest to the ISFSI
** 2B is the dosimeter located at the closest residence to the plant and ISFSI

Table B-12
Annual DLR Results for Peach Bottom Atomic Power Station 2022
(Results in Units of mrem/year)

Monitoring Location	Annual Baseline, B_A (mrem)	$B_A + MDD_A$ (mrem)	Normalized Annual Dose, M_A (mrem/yr)	Annual Facility Dose, F_A
P-TLD-14	92.8	108.9	87.8	ND
P-TLD-15	95.5	111.6	94	ND
P-TLD-16	93.7	109.8	85.1	ND
P-TLD-17	108.9	125.0	99.4	ND
P-TLD-18	95.5	111.6	92.7	ND
P-TLD-19	83.2	99.3	72.3	ND
P-TLD-1A	95	111.1	95.4	ND
P-TLD-1B	80.8	96.9	79.1	ND
P-TLD-1C	96.3	112.4	94.5	ND
P-TLD-1D	93.8	109.9	85.8	ND
P-TLD-1E	91.2	107.3	91.2	ND
P-TLD-1F	108	124.1	105.3	ND
P-TLD-1G	63.4	79.5	55	ND
P-TLD-1H	94.4	110.5	92	ND
P-TLD-1I	85.6	101.7	82.9	ND
P-TLD-1J	109	125.1	104.9	ND
P-TLD-1K	105.5	121.6	103.3	ND
P-TLD-1L	77.6	93.7	83.7	ND
P-TLD-1M	56.1	72.2	56.1	ND
P-TLD-1NN	102.1	118.2	98.2	ND
P-TLD-1P	64.6	80.7	65.1	ND
P-TLD-1Q	74.9	91.0	73.3	ND
P-TLD-1R *	131.7	147.8	134.7	ND
P-TLD-1T	104.7	120.8	90.7	ND
P-TLD-2	92.2	108.3	94.9	ND
P-TLD-22	97	113.1	91.1	ND
P-TLD-23	99.7	115.8	97.6	ND
P-TLD-24	72.3	88.4	64.5	ND
P-TLD-26	104.1	120.2	89.5	ND
P-TLD-27	98.8	114.9	93.8	ND
P-TLD-2B **	88.4	104.5	91	**ND**
P-TLD-31A	79.6	95.7	71.2	ND
P-TLD-32	101.7	117.8	95.5	ND
P-TLD-3A	69.3	85.4	66.1	ND
P-TLD-40	111.2	127.3	107.4	ND
P-TLD-42	84.2	100.3	72.3	ND
P-TLD-43	106.1	122.2	101.4	ND
P-TLD-44	91.3	107.4	85.1	ND
P-TLD-45	98.2	114.3	89.4	ND
P-TLD-46	84.2	100.3	81.3	ND
P-TLD-47	103.8	119.9	102.2	ND
P-TLD-48	97.1	113.2	95.6	ND
P-TLD-49	95.8	111.9	89.7	ND
P-TLD-4K	60.3	76.4	58	ND
P-TLD-5	87.8	103.9	82.1	ND
P-TLD-50	112.2	128.3	111.6	ND
P-TLD-51	94.5	110.6	88.1	ND
P-TLD-6B	79.1	95.2	74	ND

ND Facility Related Dose was Not Detected
* 1R is the dosimeter closest to the ISFSI
** 2B is the dosimeter located at the closest residence to the plant and ISFSI

APPENDIX C
Quality Assurance Program

Appendix C is a summary of Constellation Generation Solutions (CGS) laboratory's quality assurance program. It consists of Table C-1 which is a compilation of the results of the CGS laboratory's participation in an interlaboratory comparison program with Environmental Resource Associates (ERA) located in Arvada, Colorado and Eckert and Ziegler Analytics, Inc. (EZA) located in Atlanta, Georgia.

It also includes Table C-2, which is a compilation of the results of the Constellation Generation Solutions (CGS) Laboratory's participation in a split sample program with Teledyne Brown Engineering located in Knoxville, Tennessee and Table C-3, which is a list of the Site Specific LLDs required by the ODCM.

The CGS laboratory's results contained in Table C-1, interlaboratory comparison results, are in full agreement when they were evaluated using the NRC Resolution Test Criteria [1] except as noted in the Pass/Fail column and described below. The CGS laboratory's results are provided with their analytical uncertainties of two sigma. When evaluating with the NRC Resolution Test a one sigma uncertainty is used to determine Pass or Fail and noted accordingly.

All results reported passed their respective vendor acceptance ranges and NRC Resolution Test Criteria [1] with one exception for the Gross Beta Study ERA RAD 129, reference date 4/4/2022. The CGS result passed the low end of vendor acceptance criteria but failed NRC Resolution Test Criteria. Low recovery of activity was likely due to an ineffective residue correction factor that undercompensates for the significant residue weight present in the study accounting for the low result reported. This low value and a low uncertainty in turn resulted in an NRC Resolution Test Criteria Failure. A set of 3rd party, NIST traceable standards has been procured to build a residue correction curve for more accurate results going forward. This event has been entered into the Corrective Action Program for tracking and to prevent future occurrence.

All results reported passed their respective vendor acceptance ranges and NRC Resolution Test Criteria [1]

The vendor laboratories used by CGS for subcontracting and interlaboratory comparison samples, GEL Laboratories and Teledyne Brown Engineering, also participate in the ERA and EZA interlaboratory comparison program. A presentation of their full data report is provided in their Annual Environmental Quality Assurance Program Reports, (Ref 21,22). In summary Gel and TBE reported results met vendor and laboratory acceptance ranges with the following exceptions discussed here:

1. TBE result for Air particulate Ce-144 submitted for a study in March 2022 failed the upper acceptance limit. The laboratory investigated and the study results were outside the acceptable range specified in TBE's QA plan, 70-130% of True Value, but would have been acceptable when taking the uncertainty into account. A duplicate study was analyzed on two other

detectors and passed the upper acceptance limit. In both cases TBE's published QA requirements of acceptable range being 70-130% of True value were met. The lab's performance is within the acceptable range specified in their QA plan. This same range is considered acceptable by Constellation Nuclear Quality Assurance Requirements as well. TBE states in their investigation that there was no impact to sample data and no further action is warranted.

2. TBE result for Air particulate Co-60 study in September 2022 failed the upper acceptance limit. The laboratory investigated and the study results were outside the acceptable range specified in TBE's QA plan, 70-130% of True Value. The study was analyzed as a duplicate on another detector and passed within 114% of True Value. Historical results for Air particulate Co-60 have ranged from 91% - 141% with a mean of 91%. The lab determined no correction action needed at this time as it is the first failure for this nuclide for Air particulate.

3. GEL results for MRAD-37 Sr-90 failed vendor acceptance criteria, exceeding the maximum range for both vegetation and water. The laboratory review did not reveal any gross errors or possible contributors to the high bias. During this same analysis time period the laboratory successfully analyzed these same matrices in PT for MAPEP-47 which required the same preparation and analysis processes and procedures. The lab will continue to monitor the recoveries of these parameters to ensure there are no continued issues.

The Inter and Intra laboratory results contained in Table C-2 are intercomparison results for routine samples analyzed for replicate and split analyses and evaluated for beta and non-natural gamma emitters. The CGS laboratory's results are provided with their analytical uncertainties of 2 sigma. When evaluating with the NRC Resolution Test a one sigma uncertainty is used to determine Pass or Fail and noted accordingly. In the event there are no non-natural isotopes detected, the samples are reported <MDA and designated as Pass.

All the results contained in Table C-2 agree with their respective CGS or GEL laboratory original, replicate and/or Teledyne Brown Engineering's split laboratory sample according to NRC Resolution Test Criteria[1]. The results for separate air samplers collocated 1Z and 1A analyzed by CGS and TBE respectively are provided in Table C-2a for Air Iodine and C-2b for the Beta particulate. The results are generally in trend and a plot of the data between the two locations is found in the main body of the report, Figure A-8. The results for split samples 4L from Gross Beta are provided in Table C-2c. The results are generally in trend and a plot of the data between the two locations is found in the main body of the report, Figure A-7.

There were three of the four quarterly samples for soil at SFS3 that indicated low level, Non Plant related Cs-137 just above the analyses Minimum Detectable Activity. This activity has been investigated previously and levels are in trend with historical data at this location.

1. The original analysis of soil collected on February 21, 2022, at SFS3 indicated low level, Non Plant related Cs-137 just above the analyses Minimum Detectable Activity at 146 ±

61.9 pCi/kg. The replicate and split samples also indicated Cs-137 above the MDA, at 212 ±37.5 pCi/kg and 141±83.0 pCi/kg, respectively.

2. The original analysis of soil collected on June 6, 2022, at SFS3 indicated low level, Non Plant related Cs-137 just above the analyses MDA at 140 ± 56.2 pCi/kg. The replicate analysis confirmed Cs-137 above the MDA at 98.9 ±52.3 pCi/kg and results are in agreement when evaluated using the NRC Resolution Test Criteria[1].

3. The original analysis of soil collected on November 15, 2022, at SFS3 indicated low level, Non Plant related Cs-137 just above the analyses MDA at 133 ± 55.3 pCi/kg. The replicate analysis confirmed Cs-137 above the MDA at 169 ±61.3 pCi/kg and these results are in agreement when evaluated using the NRC Resolution Test Criteria[1].

The original, replicate and split results pass the NRC Resolution Test Criteria[1], as specified in the rule. The low-level Cs-137 observed in these soil analyses is consistent with weapons related fallout previously identified in the environs around Calvert Cliffs Nuclear Power Plant.

All air particulate samples contain Beta emitters and are reported with a 2 sigma uncertainty. The original and replicate analyses are evaluated for agreement using the NRC Resolution Test Criteria[1]. These samples must be composited for further analysis and this precludes them from being split for analysis of beta emitters. Filters and other samples whose nature generally preclude sample splitting are marked "**" in the Split Analysis column.

[1] NRC Inspection Manual, Inspection Procedure 84750, March 15, 1994

TABLE OF CONTENTS - APPENDIX C - ANALYTICAL RESULTS

Table C-1

Results of Participation in Cross Check Programs

Sample Date	Vendor	Study ID	Sample Type		Units	Equip ID	Isotope Observed	Reported Laboratory's Results			Cross Check Lab Results	NRC Resolution Test Pass / Fail [1]
3/10/2022	ANA	E13643	Milk	Gamma	pCi/L	D4	Ce-141	58.6	±	11.5	64.6	Pass
							Co-58	160	±	15.6	164	Pass
							Co-60	313	±	15.8	302	Pass
							Cr-51	390	±	95.0	339	Pass
							Cs-134	168	±	8.98	182	Pass
							Cs-137	222	±	17.4	223	Pass
							Fe-59	185	±	20.8	185	Pass
							I-131	98.9	±	21.6	96.7	Pass
							Mn-54	157	±	14.8	164	Pass
							Zn-65	231	±	31.7	246	Pass
3/10/2022	ANA	E13643	Milk	Gamma	pCi/L	D5	Ce-141	71.6	±	16.3	64.6	Pass
							Co-58	164	±	15.1	164	Pass
							Co-60	302	±	14.8	302	Pass
							Cr-51	398	±	107	339	Pass
							Cs-134	168	±	9.67	182	Pass
							Cs-137	212	±	16.0	223	Pass
							Fe-59	207	±	21.3	185	Pass
							I-131	96.2	±	26.7	96.7	Pass
							Mn-54	166	±	15.0	164	Pass
							Zn-65	230	±	31.0	246	Pass

3/10/2022	ANA	E13644	Water	Beta	pCi/L	S5E	Cs-137	224	±	4.43	222	Pass
3/10/2022	ANA	E13645	Cartridge	Gamma	pCi	D2	I-131	81.9	±	8.35	88.2	Pass
						D3	I-131	84.7	±	7.96	88.2	Pass
						D4	I-131	82.0	±	7.39	88.2	Pass
4/4/2022	ERA	RAD129	Water	Gamma	pCi/L	D4	Ba-133	56.6	±	4.24	62.9	Pass
							Cs-134	81.0	±	3.61	81.6	Pass
							Cs-137	37.8	±	4.54	36.6	Pass
							Co-60	97.6	±	5.11	97.4	Pass
							Zn-65	293	±	17.9	302	Pass
4/4/2022	ERA	RAD129	Water	Beta	pCi/L	S5E	Cs-137	35.8	±	1.88	51.0	Fail[1]
4/4/2022	ERA	RAD129	Water	Gamma	pCi/L	D4	I-131	27.1	±	4.39	26.2	Pass
6/16/2022	ANA	E13646	Water	Beta	pCi/L	S5E	Cs-137	250	±	4.66	260	Pass
6/16/2022	ANA	E13647	Water	Gamma	pCi/L	D3	Ce-141	141	±	15.5	139	Pass
							Co-58	126	±	14.9	128	Pass
							Co-60	244	±	12.6	242	Pass
							Cr-51	314	±	84.7	344	Pass
							Cs-134	163	±	9.09	172	Pass
							Cs-137	213	±	15.4	204	Pass
							Fe-59	170	±	19.0	157	Pass
							I-131	112	±	22.6	91.2	Pass
							Mn-54	243	±	16.9	229	Pass
							Zn-65	302	±	30.5	296	Pass

6/16/2022	ANA	E13647	Water	Gamma	pCi/L	D4	Ce-141	126	±	14.6	139	Pass
							Co-58	124	±	13.8	128	Pass
							Co-60	248	±	13.1	242	Pass
							Cr-51	358	±	92.9	344	Pass
							Cs-134	163	±	9.11	172	Pass
							Cs-137	217	±	15.8	204	Pass
							Fe-59	180	±	19.0	157	Pass
							I-131	86.2	±	24.2	91.2	Pass
							Mn-54	253	±	17.0	229	Pass
							Zn-65	253	±	30.2	296	Pass
6/16/2022	ANA	E13648	Filter	Gamma	pCi	D5	Ce-141	101	±	5.17	96.6	Pass
							Co-58	89.3	±	4.93	89.3	Pass
							Co-60	169	±	4.85	168	Pass
							Cr-51	252	±	34.6	239	Pass
							Cs-134	100	±	2.67	119	Pass
							Cs-137	142	±	5.25	142	Pass
							Fe-59	129	±	8.07	109	Pass
							Mn-54	168	±	5.97	159	Pass
							Zn-65	211	±	11.7	206	Pass
6/16/2022	ANA	E13648	Filter	Gamma	pCi	D4	Ce-141	96.7	±	7.64	97.0	Pass
							Co-58	89.2	±	7.09	89.0	Pass
							Co-60	171	±	7.27	168	Pass
							Cr-51	265	±	35.4	239	Pass
							Cs-134	104	±	4.09	119	Pass
							Cs-137	147	±	7.98	142	Pass
							Fe-59	136	±	10.6	109	Pass

							Mn-54	170	±	9.08	159	Pass
							Zn-65	198	±	16.4	206	Pass
6/16/2022	ANA	E13649	Filter	Beta	pCi	S5E	Cs-137	276	±	3.47	242	Pass
						S5E	Cs-137	276	±	3.47	242	Pass
						S5E	Cs-137	275	±	3.47	242	Pass
9/15/2022	ANA	E13650A	Filter	Beta	pCi	S5E	Cs-137	242	±	3.25	224	Pass
9/19/2022	ERA	MRAD037	Filter	Gamma	pCi	D4	Cs-134	270	±	6.71	325	Pass
							Cs-137	706	±	19.3	795	Pass
							Co-60	198	±	8.36	191	Pass
							Zn-65	125	±	16.5	120	Pass
10/7/2022	ERA	RAD131	Water	Gamma	pCi/L	D4	Ba-133	75.0	±	3.79	79.4	Pass
							Cs-134	29.0	±	2.09	30.5	Pass
							Cs-137	212	±	7.45	212	Pass
							Co-60	50.4	±	3.06	51.4	Pass
							Zn-65	212	±	12.8	216	Pass
							I-131	25.4	±	6.03	24.4	Pass
12/1/2022	ANA	E13651	Filter	Gamma	pCi	D4	Ce-141	144	±	9.4	140	Pass
							Co-58	143	±	12.0	144	Pass
							Co-60	174	±	10.0	181	Pass
							Cr-51	287	±	54.4	290	Pass
							Cs-134	93.0	±	5.59	120	Pass
							Cs-137	134	±	10.7	137	Pass
							Fe-59	142	±	15.9	124	Pass
							Mn-54	162	±	12.1	158	Pass

							Zn-65	192	±	23.5	191	Pass
12/1/2022	ANA	E13651	Filter	Gamma	pCi	D5	Ce-141	146	±	8.6	140	Pass
							Co-58	140	±	10.1	144	Pass
							Co-60	180	±	8.97	181	Pass
							Cr-51	286	±	46.1	290	Pass
							Cs-134	94.5	±	48.6	120	Pass
							Cs-137	125	±	91.6	137	Pass
							Fe-59	148	±	12.8	124	Pass
							Mn-54	172	±	10.4	158	Pass
							Zn-65	199	±	20.3	191	Pass
12/1/2022	ANA	E13652	Water	Beta	pCi/L	S5E	Cs-137	308	±	5.11	283	Pass
12/1/2022	ANA	E13653	Cartridge	Gamma	pCi	D2	I-131	88.7	±	9.50	91.6	Pass
						D3	I-131	88.5	±	9.40	91.6	Pass
						D4	I-131	93.5	±	8.60	91.6	Pass
						D5	I-131	89.8	±	9.10	91.6	Pass
12/1/2022	ANA	E13654	Milk	Gamma	pCi/L	D4	Ce-141	223	±	19.5	225	Pass
							Co-58	222	±	19.7	230	Pass
							Co-60	281	±	16.3	290	Pass
							Cr-51	433	±	111	464	Pass
							Cs-134	182	±	114	191	Pass
							Cs-137	214	±	18.6	219	Pass
							Fe-59	220	±	23.3	198	Pass
							I-131	104	±	22.1	95.1	Pass
							Mn-54	252	±	19.7	252	Pass
							Zn-65	274	±	38.0	305	Pass

12/1/2022	ANA	E13654	Milk	Gamma	pCi/L	D5	Ce-141	228	±	19.1	225	Pass
							Co-58	226	±	17.7	230	Pass
							Co-60	285	±	14.9	290	Pass
							Cr-51	494	±	110	464	Pass
							Cs-134	179	±	10.1	191	Pass
							Cs-137	231	±	18.0	219	Pass
							Fe-59	214	±	21.6	198	Pass
							I-131	102	±	23.0	95.1	Pass
							Mn-54	252	±	18.6	252	Pass
							Zn-65	282	±	33.4	305	Pass

[1] See discussion at the beginning of the Appendix

Table C-2

Results of Quality Assurance Program

Sample Type and Location		Sample Date	Type of Analysis	Result Units	Original Analysis	Replicate Analysis	Split Analysis	Pass/Fail (Replicate)	Pass/Fail (Split)
Water -	Circ in	1/3/2022	Gross Beta	pCi/L	2.03 ± 0.8	2.95 ± 0.8	**	Pass	NA
Water -	Circ Out	1/3/2022	Gross Beta	pCi/L	2.53 ± 0.8	2.94 ± 0.8	**	Pass	NA
Water -	OWD	1/3/2022	Gross Beta	pCi/L	2.11 ± 0.8	2.86 ± 0.8	**	Pass	NA
Water -	MCWA	1/3/2022	Gross Beta	pCi/L	1.64 ± 0.8	2.11 ± 0.8	**	Pass	NA
Water -	Webster	1/3/2022	Gross Beta	pCi/L	1.33 ± 0.7	1.75 ± 0.7	**	Pass	NA
Water -	DC	1/12/2022	Gross Beta	pCi/L	2.61 ± 1.9	4.48 ± 1.9	**	Pass	NA
Water -	ML	1/12/2022	Gross Beta	pCi/L	4.74 ± 4.1	4.96 ± 4.1	**	Pass	NA
Water -	Circ in	10/10/2022	Gross Beta	pCi/L	2.64 ± 0.8	3.48 ± 0.8	**	Pass	NA
Water -	Circ Out	10/10/2022	Gross Beta	pCi/L	2.07 ± 0.8	2.41 ± 0.8	**	Pass	NA
Water -	OWD	10/10/2022	Gross Beta	pCi/L	1.88 ± 0.7	2.61 ± 0.8	**	Pass	NA
Water -	MCWA	10/10/2022	Gross Beta	pCi/L	1.82 ± 0.7	1.74 ± 0.7	**	Pass	NA
Water -	Webster	10/10/2022	Gross Beta	pCi/L	2.23 ± 0.8	2.36 ± 0.8	**	Pass	NA
Water -	DC	10/31/2022	Gross Beta	pCi/L	5.35 ± 2.0	8.89 ± 2.3	**	Pass	NA
Water -	ML	10/31/2022	Gross Beta	pCi/L	8.19 ± 2.2	8.58 ± 2.2	**	Pass	NA
Water -	16C2	1/31/2022	Gross Beta	pCi/L	2.6 ± 0.8	NA	<2.5	NA	Pass
Water -	16C2	1/31/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	1/31/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	2/28/2022	Gross Beta	pCi/L	2.7 ± 0.9	NA	<3.3	NA	Pass
Water -	16C2	2/28/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	2/28/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	3/29/2022	Gross Beta	pCi/L	2.1 ± 0.8	NA	3.24 ± 1.7	NA	Pass
Water -	16C2	3/29/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	3/29/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water -	16C2	3/29/2022	Tritium	pCi/L	<123	NA	<194	NA	Pass
Water -	16C2	5/2/2022	Gross Beta	pCi/L	1.6 ± 0.8	NA	<2.8	NA	Pass

Water -	16C2	5/2/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	5/2/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	5/31/2022	Gross Beta	pCi/L	1.8	±	0.8	NA	<3.3			NA	Pass
Water -	16C2	5/31/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	5/31/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	6/27/2022	Gross Beta	pCi/L	5.1	±	1.0	NA	<3.0			NA	Pass
Water -	16C2	6/27/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	6/27/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	6/27/2022	Tritium	pCi/L	<164			NA	<182			NA	Pass
Water -	16C2	8/2/2022	Gross Beta	pCi/L	2.7	±	1.6	NA	<1.8			NA	Pass
Water -	16C2	8/2/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	8/2/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	8/29/2022	Gross Beta	pCi/L	3.4	±	0.7	NA	<3.1			NA	Pass
Water -	16C2	8/29/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	8/29/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	10/3/2022	Gross Beta	pCi/L	1.8	±	0.8	NA	<3.1			NA	Pass
Water -	16C2	10/3/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	10/3/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	10/3/2022	Tritium	pCi/L	<163			NA	<188			NA	Pass
Water -	16C2	10/31/2022	Gross Beta	pCi/L	2.0	±	0.8	NA	3.22	±	1.8	NA	Pass
Water -	16C2	10/31/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	10/31/2022	Gamma	pCi/L	<MDA			NA	<MDA			NA	Pass
Water -	16C2	11/29/2022	Gross Beta	pCi/L	1.8	±	0.8	NA	<2.7			NA	Pass
Water -	16C2	11/29/2022	LLI	pCi/L	<MDA			NA	<MDA			NA	Pass

Water -	16C2	11/29/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Water -	16C2	1/3/2023	Gross Beta	pCi/L	2.4	±	0.8	NA	<3.0	NA	Pass
Water -	16C2	1/3/2023	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Water -	16C2	1/3/2023	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Water -	16C2	1/3/2023	Tritium	pCi/L		<156		NA	<178	NA	Pass
Milk-	19B1	1/18/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	1/18/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	25C1	1/18/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	25C1	1/18/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	4/11/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	4/11/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	25C1	4/11/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	25C1	4/11/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	7/5/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	7/5/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	10/11/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	19B1	10/11/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	22B1	12/6/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	22B1	12/6/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm V	2/08/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm V	2/08/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm S	2/08/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm S	2/08/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm J	2/09/2022	LLI	pCi/L		<MDA		NA	<MDA	NA	Pass
Milk-	Farm J	2/09/2022	Gamma	pCi/L		<MDA		NA	<MDA	NA	Pass

Milk-	Farm V	5/10/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm V	5/10/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	5/10/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	5/10/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	5/10/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	5/10/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm V	8/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm V	8/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	8/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	8/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	8/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	8/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	11/08/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm J	11/08/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	11/08/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm S	11/08/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm V	11/09/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Milk-	Farm V	11/09/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	2/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	2/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	3/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	3/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	3/31/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	3/31/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	3/31/2022	Tritium	pCi/L	<125	NA	259±129	NA	Pass

Water-	4L	4/28/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	4/28/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	6/02/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	6/02/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	6/29/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	6/29/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	6/29/2022	Tritium	pCi/L	<169	NA	<167	NA	Pass
Water-	4L	7/28/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	7/28/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	9/01/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	9/01/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	9/29/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	9/29/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	9/29/2022	Tritium	pCi/L	<153	NA	<161	NA	Pass
Water-	4L	11/03/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	11/03/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	11/30/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	11/30/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	12/29/2022	LLI	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	12/29/2022	Gamma	pCi/L	<MDA	NA	<MDA	NA	Pass
Water-	4L	12/29/2022	Tritium	pCi/L	<94.2	NA	<185	NA	Pass

Composite-	1Z	3/31/2022	Gamma	pCi/ m3	1Z	<MDA	NA	1A	<MDA	NA	Pass
Composite-	1Z	6/29/2022	Gamma	pCi/ m3	1Z	<MDA	NA	1A	<MDA	NA	Pass
Composite-	1Z	9/29/2022	Gamma	pCi/ m3	1Z	<MDA	NA	1A	<MDA	NA	Pass
Composite-	1Z	12/29/2022	Gamma	pCi/ m3	1Z	<MDA	NA	1A	<MDA	NA	Pass
Composite-	11S1	3/29/2022	Gamma	pCi/m3	11S1	<MDA	NA	11S2	<MDA	NA	Pass
Composite-	11S1	6/27/2022	Gamma	pCi/m3	11S1	<MDA	NA	11S2	<MDA	NA	Pass
Composite-	11S1	10/3/2022	Gamma	pCi/m3	11S1	<MDA	NA	11S2	<MDA	NA	Pass
Composite-	11S1	1/3/2023	Gamma	pCi/m3	11S1	<MDA	NA	11S2	<MDA	NA	Pass
Air Filter -	A1	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.7	± 0.2	2.8 ± 0.2		**	Pass	NA
Air Filter -	A1	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.6	± 0.1	1.6 ± 0.1		**	Pass	NA
Air Filter -	A1	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.8	± 0.1	1.8 ± 0.1		**	Pass	NA
Air Filter -	A1	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.4	± 0.1	2.3 ± 0.1		**	Pass	NA
Air Filter -	A1	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.3	± 0.1	2.2 ± 0.1		**	Pass	NA
Air Filter -	A1	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.4	± 0.1	3.3 ± 0.2		**	Pass	NA
Air Filter -	A1	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.1	± 0.1	1.3 ± 0.1		**	Pass	NA
Air Filter -	A1	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.5	± 0.1	1.6 ± 0.1		**	Pass	NA
Air Filter -	A2	1/10/2022	Gross Beta	10-2 pCi/m3	2.4	± 0.2	2.4 ± 0.2		**	Pass	NA
Air Filter -	A2	4/18/2022	Gross Beta	10-2 pCi/m3	1.4	± 0.1	1.3 ± 0.1		**	Pass	NA
Air Filter -	A2	4/25/2022	Gross Beta	10-2 pCi/m3	1.6	± 0.1	1.6 ± 0.1		**	Pass	NA
Air Filter -	A2	5/02/2022	Gross Beta	10-2 pCi/m3	2.2	± 0.2	2.0 ± 0.1		**	Pass	NA
Air Filter -	A2	6/06/2022	Gross Beta	10-2 pCi/m3	1.7	± 0.1	1.7 ± 0.1		**	Pass	NA
Air Filter -	A2	8/29/2022	Gross Beta	10-2 pCi/m3	3.0	± 0.1	3.0 ± 0.2		**	Pass	NA
Air Filter -	A2	10/31/2022	Gross Beta	10-2 pCi/m3	1.1	± 0.1	1.2 ± 0.1		**	Pass	NA
Air Filter -	A2	11/15/2022	Gross Beta	10-2 pCi/m3	1.5	± 0.1	1.6 ± 0.1		**	Pass	NA

Air Filter -	A3	1/10/2022	Gross Beta	10^{-2} pCi/m^3	3.1	±	0.2	2.9	±	0.2	**	Pass	NA
Air Filter -	A3	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.5	±	0.1	**	Pass	NA
Air Filter -	A3	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.8	±	0.1	1.8	±	0.1	**	Pass	NA
Air Filter -	A3	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.6	±	0.1	2.1	±	0.1	**	Pass	NA
Air Filter -	A3	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.3	±	0.1	2.3	±	0.2	**	Pass	NA
Air Filter -	A3	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.6	±	0.1	3.5	±	0.2	**	Pass	NA
Air Filter -	A3	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.0	±	0.1	1.0	±	0.1	**	Pass	NA
Air Filter -	A3	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.6	±	0.1	**	Pass	NA
Air Filter -	A4	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.7	±	0.2	2.9	±	0.2	**	Pass	NA
Air Filter -	A4	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.5	±	0.1	**	Pass	NA
Air Filter -	A4	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.8	±	0.1	1.9	±	0.1	**	Pass	NA
Air Filter -	A4	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.4	±	0.1	2.2	±	0.1	**	Pass	NA
Air Filter -	A4	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.3	±	0.1	2.3	±	0.1	**	Pass	NA
Air Filter -	A4	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.6	±	0.1	3.8	±	0.2	**	Pass	NA
Air Filter -	A4	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.2	±	0.1	1.3	±	0.1	**	Pass	NA
Air Filter -	A4	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.6	±	0.1	1.8	±	0.1	**	Pass	NA
Air Filter -	A5	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.8	±	0.2	2.8	±	0.2	**	Pass	NA
Air Filter -	A5	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.4	±	0.1	1.4	±	0.1	**	Pass	NA
Air Filter -	A5	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.7	±	0.1	1.8	±	0.1	**	Pass	NA
Air Filter -	A5	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.6	±	0.2	2.2	±	0.1	**	Pass	NA
Air Filter -	A5	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.2	±	0.1	2.3	±	0.2	**	Pass	NA
Air Filter -	A5	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.9	±	0.1	3.9	±	0.2	**	Pass	NA
Air Filter -	A5	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.2	±	0.1	1.3	±	0.1	**	Pass	NA
Air Filter -	A5	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.7	±	0.1	1.8	±	0.1	**	Pass	NA
Air Filter -	SFA1	1/10/2022	Gross Beta	10^{-2} pCi/m^3	3.1	±	0.2	3.0	±	0.2	**	Pass	NA
Air Filter -	SFA1	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.4	±	0.1	1.5	±	0.1	**	Pass	NA

Air Filter -	SFA1	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.6	±	0.1	1.7	±	0.1	**	Pass	NA
Air Filter -	SFA1	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.2	±	0.1	2.2	±	0.1	**	Pass	NA
Air Filter -	SFA1	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.2	±	0.1	2.0	±	0.2	**	Pass	NA
Air Filter -	SFA1	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.2	±	0.1	3.2	±	0.2	**	Pass	NA
Air Filter -	SFA1	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.0	±	0.1	1.1	±	0.1	**	Pass	NA
Air Filter -	SFA1	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.6	±	0.1	**	Pass	NA
Air Filter -	SFA2	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.7	±	0.2	2.8	±	0.2	**	Pass	NA
Air Filter -	SFA2	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.6	±	0.1	1.6	±	0.1	**	Pass	NA
Air Filter -	SFA2	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.8	±	0.1	1.8	±	0.1	**	Pass	NA
Air Filter -	SFA2	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.2	±	0.1	2.4	±	0.1	**	Pass	NA
Air Filter -	SFA2	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.4	±	0.1	2.4	±	0.1	**	Pass	NA
Air Filter -	SFA2	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.3	±	0.1	3.4	±	0.2	**	Pass	NA
Air Filter -	SFA2	10/31/2022	Gross Beta	10^{-2} pCi/m^3	1.0	±	0.1	1.0	±	0.1	**	Pass	NA
Air Filter -	SFA2	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.6	±	0.1	**	Pass	NA
Air Filter -	SFA3	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.9	±	0.2	3.0	±	0.2	**	Pass	NA
Air Filter -	SFA3	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.5	±	0.1	1.4	±	0.1	**	Pass	NA
Air Filter -	SFA3	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.6	±	0.1	1.7	±	0.1	**	Pass	NA
Air Filter -	SFA3	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.3	±	0.1	2.1	±	0.1	**	Pass	NA
Air Filter -	SFA3	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.4	±	0.1	2.2	±	0.2	**	Pass	NA
Air Filter -	SFA3	8/29/2022	Gross Beta	10^{-2} pCi/m^3	3.5	±	0.1	3.3	±	0.2	**	Pass	NA
Air Filter -	SFA3	10/31/2022	Gross Beta	10^{-2} pCi/m^3	0.9	±	0.1	1.1	±	0.1	**	Pass	NA
Air Filter -	SFA3	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.2	±	0.1	1.5	±	0.1	**	Pass	NA
Air Filter -	SFA4	1/10/2022	Gross Beta	10^{-2} pCi/m^3	2.7	±	0.2	2.8	±	0.2	**	Pass	NA
Air Filter -	SFA4	4/18/2022	Gross Beta	10^{-2} pCi/m^3	1.4	±	0.1	1.4	±	0.1	**	Pass	NA
Air Filter -	SFA4	4/25/2022	Gross Beta	10^{-2} pCi/m^3	1.7	±	0.1	1.7	±	0.1	**	Pass	NA

Air Filter -	SFA4	5/2/2022	Gross Beta	10^{-2} pCi/m^3	2.2	±	0.1	2.0	±	0.1	**	Pass	NA
Air Filter -	SFA4	6/6/2022	Gross Beta	10^{-2} pCi/m^3	2.0	±	0.1	2.1	±	0.1	**	Pass	NA
Air Filter -	SFA4	10/31/2022	Gross Beta	10^{-2} pCi/m^3	0.9	±	0.1	1.1	±	0.1	**	Pass	NA
Air Filter -	SFA4	11/15/2022	Gross Beta	10^{-2} pCi/m^3	1.3	±	0.1	1.5	±	0.1	**	Pass	NA
Air Filter -	STATION-02	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.0	±	0.1	3.1	±	0.1	**	Pass	NA
Air Filter -	STATION-03	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.0	±	0.2	3.1	±	0.1	**	Pass	NA
Air Filter -	STATION-04	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.4	±	0.3	3.2	±	0.3	**	Pass	NA
Air Filter -	STATION-05	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.4	±	0.2	3.4	±	0.2	**	Pass	NA
Air Filter -	STATION-06	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.3	±	0.2	3.4	±	0.2	**	Pass	NA
Air Filter -	STATION-07	4/18/2022	Gross Beta	10^{-2} pCi/m^3	3.6	±	0.2	3.6	±	0.2	**	Pass	NA
Air Filter -	STATION-08	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.0	±	0.2	3.3	±	0.2	**	Pass	NA
Air Filter -	STATION-09	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.4	±	0.2	3.2	±	0.2	**	Pass	NA
Air Filter -	STATION-10	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.5	±	0.2	3.5	±	0.2	**	Pass	NA
Air Filter -	STATION-11	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.4	±	0.2	3.2	±	0.2	**	Pass	NA
Air Filter -	STATION-12	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.3	±	0.2	3.4	±	0.2	**	Pass	NA
Air Filter -	STATION-13	4/19/2022	Gross Beta	10^{-2} pCi/m^3	3.4	±	0.2	3.4	±	0.2	**	Pass	NA
Air Iodine -	A1	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	A2	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	A3	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	A4	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	A5	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	SFA1	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	SFA2	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	SFA3	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	SFA4	1/18/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA
Air Iodine -	A1	2/15/2022	I-131	pCi/m3	<MDA			<MDA			**	Pass	NA

Air Iodine -	A2	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	2/15/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A2	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	5/9/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A2	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	8/1/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA

Air Iodine -	A2	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	9/6/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-02	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-04	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-07	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-08	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-09	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-11	10/4/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A2	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	10/24/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA

Air Iodine -	A2	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-02	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-04	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-07	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-08	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-09	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	STATION-11	12/19/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A1	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A2	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A3	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A4	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	A5	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA1	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA2	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA3	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Air Iodine -	SFA4	12/27/2022	I-131	pCi/m3	<MDA	<MDA	**	Pass	NA
Soil-	SFS3[1]	2/21/2022	Gamma	pCi/kg	146 ± 61.9	212 ± 67.5	141 ± 83.0	Pass	Pass
Soil-	SFS3	6/6/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Soil-	SFS5	6/6/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA

Sediment-	WBS2	6/21/2022	Gamma	pCi/kg	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	A1	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	A2	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	A3	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	A4	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	A5	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	SFA1	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	SFA2	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	SFA3	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Air Filter -	SFA4	6/27/2022	Gamma	pCi/m3	<MDA	<MDA	<MDA	Pass	Pass
Cabbage-	IB8	6/27/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Water-	WA1	7/1/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Water-	WA2	7/1/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Cabbage-	IB4	7/25/2022	Gamma	pCi/kg	<MDA	<MDA	<MDA	Pass	Pass
Tomato-	EAST	7/28/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Zucchini-	SSE	7/28/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Zucchini-	EAST	7/28/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Water-	WA1	7/29/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Water-	WA2	7/29/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Fish-	IA1	8/24/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Oysters-	IA3	8/24/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Collards-	IB4	9/19/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA
Kale-	IB5	9/19/2022	Gamma	pCi/kg	<MDA	<MDA	NA	Pass	NA

Water-	WA1	9/30/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Water-	WA2	9/30/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Sediment-	WB1	10/3/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Milk-	Farm A	10/5/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Milk-	Farm B	10/3/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Oysters-	IA3	10/11/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Oysters-	IA6	10/11/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Vegetation-	SFB1	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Vegetation-	SFB5	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Fish-	NORTH	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Fish-	WEST	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	<MDA	Pass	Pass
Soil-	SFS3[1]	11/15/2022	Gamma	pCi/kg	133	± 55.3	169	± 61.3	NA	Pass	NA
Soil-	SFS1	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	NA	Pass	NA
Soil-	SFS2	11/15/2022	Gamma	pCi/kg		<MDA		<MDA	NA	Pass	NA
Milk-	18E1	11/22/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Milk-	19B1	11/22/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Milk-	G2-1Q	11/23/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Milk-	Farm A	11/28/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA
Milk-	Farm B	11/28/2022	Gamma	pCi/L		<MDA		<MDA	NA	Pass	NA

Water-	WA1	11/29/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Water-	WA2	11/29/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Water-	4L	11/30/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Water-	Q9-1	11/30/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Milk-	Farm J	12/6/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Milk-	Farm S	12/6/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Milk-	Farm V	12/7/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Milk-	G2-1Q	12/7/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Water-	4L	12/29/2022	Gamma	pCi/L	<MDA	<MDA	<MDA	Pass	Pass
Water-	WA1	12/29/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA
Water-	WA2	12/29/2022	Gamma	pCi/L	<MDA	<MDA	NA	Pass	NA

[1] See discussion at the beginning of the Appendix
** The nature of these samples precluded splitting them with an independent laboratory.

Table C-2a

Results of Quality Assurance Program
Co-Located Air Samplers 1Z and 1A

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 ± 2σ)

Start Date	Stop Date	Isotope Observed	1Z Analysis by CGS	1A Analysis by TBE
1/4/2022	1/13/2022	I-131	<MDA	<MDA
1/13/2022	1/20/2022	I-131	<MDA	<MDA
1/20/2022	1/28/2022	I-131	<MDA	<MDA
1/28/2022	2/2/2022	I-131	<MDA	<MDA
2/2/2022	2/9/2022	I-131	<MDA	<MDA
2/9/2022	2/17/2022	I-131	<MDA	<MDA
2/17/2022	2/23/2022	I-131	<MDA	<MDA
2/23/2022	3/2/2022	I-131	<MDA	<MDA
3/2/2022	3/10/2022	I-131	<MDA	<MDA
3/10/2022	3/17/2022	I-131	<MDA	<MDA
3/17/2022	3/24/2022	I-131	<MDA	<MDA
3/24/2022	3/31/2022	I-131	<MDA	<MDA
3/31/2022	4/7/2022	I-131	<MDA	<MDA
4/7/2022	4/14/2022	I-131	<MDA	<MDA
4/14/2022	4/21/2022	I-131	<MDA	<MDA
4/21/2022	4/28/2022	I-131	<MDA	<MDA
4/28/2022	5/5/2022	I-131	<MDA	<MDA

Table C-2a

Results of Quality Assurance Program
Co-Located Air Samplers 1Z and 1A

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 ± 2σ)

Start Date	Stop Date	Isotope Observed	1Z Analysis by CGS	1A Analysis by TBE
5/5/2022	5/12/2022	I-131	<MDA	<MDA
5/12/2022	5/19/2022	I-131	<MDA	<MDA
5/19/2022	5/26/2022	I-131	<MDA	<MDA
5/26/2022	6/2/2022	I-131	<MDA	<MDA
6/2/2022	6/9/2022	I-131	<MDA	<MDA
6/9/2022	6/16/2022	I-131	<MDA	<MDA
6/16/2022	6/23/2022	I-131	<MDA	<MDA
6/23/2022	6/29/2022	I-131	<MDA	<MDA
6/29/2022	7/7/2022	I-131	<MDA	<MDA
7/7/2022	7/14/2022	I-131	<MDA	<MDA
7/14/2022	7/21/2022	I-131	<MDA	<MDA
7/21/2022	7/28/2022	I-131	<MDA	<MDA
7/28/2022	8/4/2022	I-131	<MDA	<MDA
8/4/2022	8/11/2022	I-131	<MDA	<MDA
8/11/2022	8/18/2022	I-131	<MDA	<MDA
8/18/2022	8/25/2022	I-131	<MDA	<MDA
8/25/2022	9/1/2022	I-131	<MDA	<MDA

Table C-2a

Results of Quality Assurance Program
Co-Located Air Samplers 1Z and 1A

Concentration of Iodine-131 in Filtered Air
(Results in units of 10^{-3} pCi/m^3 ± 2σ)

Start Date	Stop Date	Isotope Observed	1Z Analysis by CGS	1A Analysis by TBE
9/1/2022	9/8/2022	I-131	<MDA	<MDA
9/8/2022	9/15/2022	I-131	<MDA	<MDA
9/15/2022	9/22/2022	I-131	<MDA	<MDA
9/22/2022	9/29/2022	I-131	<MDA	<MDA
9/29/2022	10/6/2022	I-131	<MDA	<MDA
10/6/2022	10/13/2022	I-131	<MDA	<MDA
10/13/2022	10/21/2022	I-131	<MDA	<MDA
10/21/2022	10/27/2022	I-131	<MDA	<MDA
10/27/2022	11/3/2022	I-131	<MDA	<MDA
11/3/2022	11/10/2022	I-131	<MDA	<MDA
11/10/2022	11/17/2022	I-131	<MDA	<MDA
11/17/2022	11/23/2022	I-131	<MDA	<MDA
11/23/2022	11/30/2022	I-131	<MDA	<MDA
11/30/2022	12/8/2022	I-131	<MDA	<MDA
12/8/2022	12/15/2022	I-131	<MDA	<MDA
12/15/2022	12/22/2022	I-131	<MDA	<MDA
12/22/2022	12/29/2022	I-131	<MDA	<MDA

Table C-2b

Results of Quality Assurance Program

Co-Located Air Samplers 1Z and 1A

Concentration of Beta Emitters in Air Particulates

(Results in units of 10^{-2} pCi/m^3 ± 2σ)

Start Date	Stop Date	1Z Analysis by CGS	1A Analysis by TBE
1/4/2022	1/13/2022	3.0 ± 0.2	3.1 ± 0.4
1/13/2022	1/20/2022	2.8 ± 0.2	2.3 ± 0.5
1/20/2022	1/28/2022	2.6 ± 0.2	2.6 ± 0.5
1/28/2022	2/2/2022	2.4 ± 0.3	2.4 ± 0.6
2/2/2022	2/9/2022	1.9 ± 0.2	1.8 ± 0.4
2/9/2022	2/17/2022	2.2 ± 0.2	1.8 ± 0.4
2/17/2022	2/23/2022	1.9 ± 0.2	2.4 ± 0.5
2/23/2022	3/2/2022	2.8 ± 0.2	2.3 ± 0.5
3/2/2022	3/10/2022	2.5 ± 0.3	2.0 ± 0.4
3/10/2022	3/17/2022	2.8 ± 0.3	2.3 ± 0.5
3/17/2022	3/24/2022	1.9 ± 0.2	1.9 ± 0.5
3/24/2022	3/31/2022	1.5 ± 0.2	1.5 ± 0.4
3/31/2022	4/7/2022	1.7 ± 0.2	1.6 ± 0.4
4/7/2022	4/14/2022	1.5 ± 0.2	1.4 ± 0.4
4/14/2022	4/21/2022	1.7 ± 0.2	1.1 ± 0.4
4/21/2022	4/28/2022	2.2 ± 0.2	2.5 ± 0.5
4/28/2022	5/5/2022	2.6 ± 0.2	2.5 ± 0.5
5/5/2022	5/12/2022	2.2 ± 0.2	2.0 ± 0.5
5/12/2022	5/19/2022	1.2 ± 0.2	1.4 ± 0.4
5/19/2022	5/26/2022	2.7 ± 0.3	2.2 ± 0.5
5/26/2022	6/2/2022	1.6 ± 0.3	1.8 ± 0.4
6/2/2022	6/9/2022	2.3 ± 0.2	2.0 ± 0.4
6/9/2022	6/16/2022	2.3 ± 0.2	2.1 ± 0.5
6/16/2022	6/23/2022	2.5 ± 0.2	1.4 ± 0.4
6/23/2022	6/29/2022	1.9 ± 0.3	<MDA
6/29/2022	7/7/2022	2.4 ± 0.2	2.2 ± 0.4
7/7/2022	7/14/2022	2.5 ± 0.2	2.5 ± 0.5
7/14/2022	7/21/2022	3.1 ± 0.2	2.7 ± 0.5
7/21/2022	7/28/2022	3.4 ± 0.2	3.3 ± 0.5

Start Date	Stop Date	1Z Analysis by CGS			1A Analysis by TBS		
7/28/2022	8/4/2022	3.0	±	0.3	2.4	±	0.5
8/4/2022	8/11/2022	2.1	±	0.3	1.8	±	0.4
8/11/2022	8/18/2022	3.0	±	0.2	2.3	±	0.5
8/18/2022	8/25/2022	2.6	±	0.2	2.5	±	0.5
8/25/2022	9/1/2022	2.8	±	0.2	3.4	±	0.5
9/1/2022	9/8/2022	2.1	±	0.3	1.6	±	0.4
9/8/2022	9/15/2022	2.6	±	0.2	2.1	±	0.4
9/15/2022	9/22/2022	4.7	±	0.3	3.5	±	0.5
9/22/2022	9/29/2022	2.5	±	0.2	1.4	±	0.4
9/29/2022	10/6/2022	1.8	±	0.2		<MDA	
10/6/2022	10/13/2022	4.2	±	0.3	3.7	±	0.6
10/13/2022	10/21/2022	2.8	±	0.2	2.8	±	0.5
10/21/2022	10/27/2022	2.8	±	0.3	2.1	±	0.5
10/27/2022	11/3/2022	3.0	±	0.3	2.0	±	0.4
11/3/2022	11/10/2022	2.9	±	0.2	2.1	±	0.4
11/10/2022	11/17/2022	2.0	±	0.2	1.6	±	0.4
11/17/2022	11/23/2022	4.1	±	0.3	2.7	±	0.5
11/23/2022	11/30/2022	5.1	±	0.3	3.2	±	0.6
11/30/2022	12/8/2022	4.4	±	0.3	3.2	±	0.4
12/8/2022	12/15/2022	3.0	±	0.2	2.4	±	0.4
12/15/2022	12/22/2022	3.0	±	0.2	2.7	±	0.4
12/22/2022	12/29/2022	4.1	±	0.3	3.3	±	0.6

Table C-2c

Results of Quality Assurance Program

4L Analyzed by Primary and QC Laboratories

Concentration of Beta Emitters in Water

(Results in units of pCi/L ± 2σ)

Start Date	Stop Date	4L Analysis by CGS	4L Split Analysis by TBE	NRC Acceptance [1]
1/04/2022	2/02/2022	1.10 ± 0.72	<1.96	Pass
2/02/2022	3/02/2022	1.60 ± 0.77	<2.49	Pass
3/02/2022	3/31/2022	1.91 ± 0.79	<1.80	Pass
3/31/2022	4/28/2022	1.21 ± 0.77	<1.97	Pass
4/28/2022	6/2/2022	1.83 ± 0.75	2.0 ± 1.38	Pass
6/02/2022	6/29/2022	1.51 ± 0.79	<2.11	Pass
6/29/2022	7/28/2022	2.34 ± 0.51	2.8 ± 1.46	Pass
7/282022	9/01/2022	5.76 ± 0.44	3.42 ± 1.92	Pass
9/01/2022	9/29/2022	2.41 ± 0.81	3.32 ± 1.63	Pass
9/29/2022	11/3/2022	1.97 ± 0.78	2.21 ± 1.31	Pass
11/3/2022	11/30/2022	2.62 ± 0.77	<2.14	Pass
11/30/2022	12/29/2022	1.07 ± 0.66	<2.18	Pass

[1] See discussion at the beginning of the Appendix

TABLE C-3

Peach Bottom Atomic Power Station ODCM Required LLDs

Selected Nuclides	Water pCi/l	Fish/Shellfish pCi/kg	Milk pCi/L	Sediment pCi/kg	Vegetation pCi/kg	Particulates pCi/m^3
Gross Beta	4	--	--	--	--	0.01
H-3	2000	--	--	--	--	--
Mn-54	15	130	--	--	--	--
Co-58	15	130	--	--	--	--
Fe-59	30	260	--	--	--	--
Co-60	15	130	--	--	--	--
Zn-65	30	260	--	--	--	--
Zr-95	30	--	--	--	--	--
Nb-95	15	--	--	--	--	--
I-131	--	--	1	--	60	0.07[1]
Cs-134	15	130	15	150	60	0.05
Cs-137	18	150	18	180	80	0.06
Ba-140	60	--	60	--	--	--
La-140	15	--	15	--	--	--

[1] Air samples for I-131 are collected separately on a charcoal radioiodine cannister

APPENDIX D

Land Use Survey

Appendix D contains the results of a Land Use Survey conducted in the fall of 2022 around PBAPS performed by Constellation Generation Solutions to comply with Section 3.8.E.2 of PBAPS 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 2021 report. There were gardens identified in all sectors except the NNW sector. Eleven (11) new gardens were located this year in SSE, S, WSW, W, WNW, and NW sectors within three (3) miles of the PBAPS release vents. The nearest garden in the NW sector has been updated from the 2021 report; all other sectors are the same as in the 2021 report.

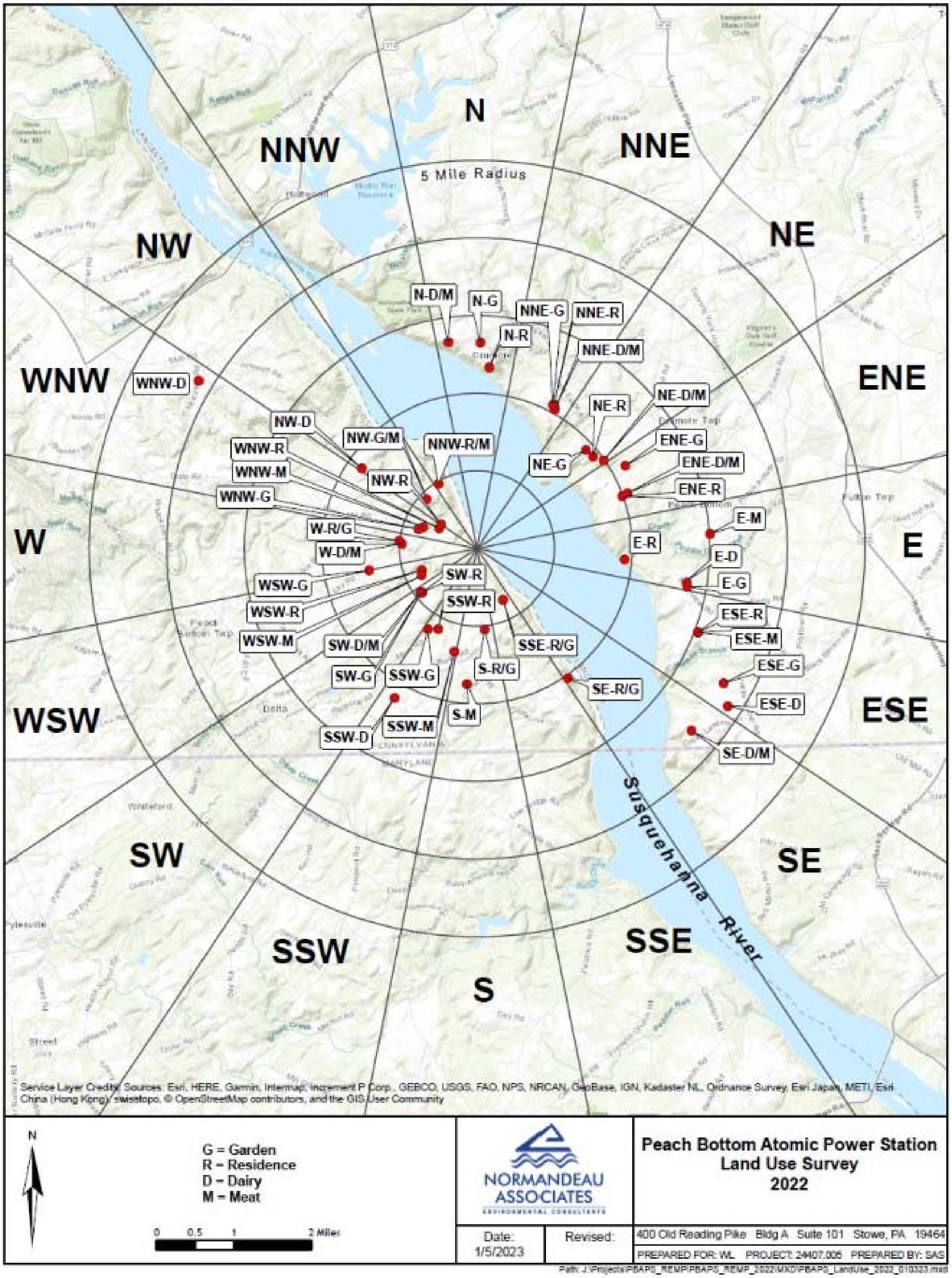
Animals used for meat consumption were identified in all 16 sectors. One (1) new site was identified this year in E sector, within the three (3) mile radius of PBAPS. One (1) new site was identified this year in N sector, within three (5) miles of the PBAPS. The nearest meat animal in the E sector and has been updated from the 2021 report. The nearest animal in all other sectors remains the same as in last year's report. Dairy sites were identified in 13 of 16 sectors. There were two (2) new dairy sites observed in the NNE sector within the three (3) mile radius of the Peach Bottom vents. There were no changes in the nearest milk-producing animal in any sector.

Table D-1
Land Use Survey
Distance of the Nearest Residence, Garden, Dairy,
Meat Animal within a Five Mile Radius of
Peach Bottom Atomic Power Station
(Distance in feet)
2022

Sector	Residence	Garden [1]	Milk Animal	Meat Animal
N	12,362	14,003	14,183	14,183
NNE	11,112	11,041	10,843	10,843
NE	10,080	10,004	10,492	10,080
ENE	10,495	11,554	10,925*	10,925
E	10,066	14,540	14,471	14,995
ESE	16,085	19,109	20,154	16,085
SE	10,772	10,772	19,134*	19,134
SSE	3,912	3,912	-	-
S	5,545	5,545	-	9,247
SSW	6,072	6,418	11,602	7,187
SW	4,755	4,865	4,860*	4,860
WSW	4,036	7,487	-	4,204
W	5,327	5,327	5,136*	5,136
WNW	2,928	4,192	22,124	3,926
NW	2,948	4,806	9,545	4,806
NNW	5,124	-	-	5,124

[1] Larger than 500 square feet (as can best be determined from a distance)
* Denotes current REMP milk sample location
Red Denotes the site/site information has been updated from the previous year's Land Use Census

Figure D-1
Peach Bottom Atomic Power Station Land Use Census



APPENDIX E

Annual Radiological Groundwater Protection Program Report

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 2022 through 31 December 2022. 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 2022. During that time period, 252 analyses were performed on 108 samples from 36 locations. These 36 locations include 24 groundwater monitoring wells, 2 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'.

Based on the review of the data collected during the 2022 RGPP sampling rounds AMO Environmental Decisions concludes:

Monthly sampling of MW-PB-24, MW-PB-25, MW-PB-26, and MW-PB-27 was completed in 2022 to monitor tritium concentrations in the area of MW-PB-25. In 2022, The average tritium concentration in samples collected from MW-PB-25 was approximately 7,400 pCi/L.

The 3rd quarter 2022 RGPP sample collected from MW-PB-30 had a reported tritium concentration of 37,300 pCi/L. A subsequent sample was collected from MW-PB-30 on October 1, 2022 and the tritium result was 563 pCi/L, which reflected historic tritium concentrations in this well. The 4th quarter sample collected from MW-PB-30 had a tritium concentration of 683 pCi/L. However, the tritium concentration increased to 19,100 pCi/L in a subsequent sample collected in the middle of December 2022. An additional sample was collected from MW-PB-30 in the beginning of January 2023 and the concentration decreased to 1,880 pCi/L. It was recommended that the Station sample MW-PB-30, as well as nearby wells MW-PB-29 and MW-PB-31, monthly to more closely monitor tritium concentrations in the area of this well. According to Station personnel, a tritium "Hit Team" was formed to evaluate potential tritium sources in the area of this well.

Gross-alpha analysis was most recently performed on Source and Long-Term Shutdown designated wells, during the 2nd quarter 2022 RGPP sampling round. Gross-alpha (suspended) results from samples collected from MW-PB-16 and MW-PB-27 exceeded the respective Alert Levels for the monitoring wells. Therefore, the samples from these wells required select transuranic analysis. All Long-Term Shutdown and Source designated wells will have gross-alpha analysis performed again in 2024.

The 2nd quarter 2022 RGPP samples collected from MW-PB-25 and MW-PB-27 were analyzed for select transuranics. U-233/234 and U-238 were detected in both samples. The U-233/234 concentrations ranged between 0.6368 pCi/L (MW-PB-25) and 5.603 pCi/L (MW-PB-27). The U-238 concentrations ranged between 0.3184 pCi/L (MW-PB-25) and 2.287 pCi/L (MW-PB-27). The Uranium detections are attributed to naturally occurring radioactivity. Additionally, to satisfy the American Nuclear Insurers (ANI) request, the well with the highest average gross-alpha (dissolved) concentration (MW-PB-16) was analyzed for select transuranics during the 2nd quarter 2022. No select transuranics were detected in the sample collected from MW-PB-16.

The sample collected from MW-PB-30 was analyzed for select transuranics during the 4th quarter 2022 due to an unexpected increase in tritium concentration during the 3rd quarter 2022 RGPP sampling round. No select transuranics were detected in the sample collected from MW-PB-30 during the 4th quarter 2022.

Gamma-radionuclides were not detected at concentrations greater than their respective LLDs in 2022. Gamma-radionuclides and gross-alpha analyses will be performed again in 2024.

Sr-89 and Sr-90 were not detected at concentrations greater than their respective LLDs in 2022.

Hard-to-detects (Fe-55 and Ni-63) were not detected at concentrations greater than their respective LLDs in 2021. Hard-to-detects (Fe-55 and Ni-63) analyses will be performed on samples collected from Long-Term Shutdown designated wells in 2023 and Source designated wells in 2026.

Tritium present in precipitation recapture was not likely to affect groundwater quality in the vicinity of the PBAPS in 2022.

The wells sampled effectively monitored groundwater conditions at the facility.

In assessing all the data gathered for this report, it was concluded that the station conformed with its RGPP in 2022 with respect to sampling protocol and the operation of PBAPS had no adverse radiological impact on the environment offsite of PBAPS.

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 2022.

A. Objective of the RGPP

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

Samples for the ongoing ground water monitoring program were collected by Constellation Generation Solutions (CGS). This section describes the general collection methods used to obtain environmental samples for the PBAPS RGPP in 2022. Sample locations can be found in Table E–1, Appendix E.

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 hydrogeologist for adverse trends or changes to hydrogeologic conditions.

D. Characteristics of Tritium (H-3)

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 and/or boron-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 (3He). 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 is one of the least dangerous radionuclides because it emits very weak radiation 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 to analyze the environmental samples for radioactivity for the PBAPS RGPP in 2022.

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, Am-241, Cm-242, Cm-243, Cm-244, Pu-238, Pu-239, Pu-240, U-233, U-234, U-235, U-238, 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. Lower Limit of Detection
   The lower limit of detection (LLD) is a minimum sensitivity value that must be achieved routinely by the analytical parameter.

2. Laboratory Measurements Uncertainty
   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 lithium present in crystalline rocks by neutrons produced by the radioactive decay of naturally abundant uranium and thorium. Lithogenic production of tritium is usually negligible compared to other sources due to the limited abundance of lithium 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 below100 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.

The Constellation fleet-wide and Peach Bottom RGPP was modified at the beginning of 2020. Changes to the RGPP included sample locations, frequency, and the removal of surface water sampling.

IV. Results and Discussion

A. Groundwater Results

Samples were collected from onsite 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. (Appendix E, Table E–9) Tritium values ranged from non-detectable to 37,300 pCi/L. There is no drinking water pathway available from these groundwater sample locations.

Strontium

Samples from 15 locations, Monitoring Wells and Yard drains, were analyzed for Sr-89 and Sr-90. All results were below the required LLDs. (Appendix E, Table E–6)

GrossAlpha(dissolved and suspended)

Samples from 15 locations, Monitoring Wells and Yard drains, were analyzed for gross alpha. Gross alpha activity ranged from non-detectable to 41.2 pCi/L in 2022. (Appendix E, Table E-8)

Select Transuranics

Samples from 4 locations were analyzed for select transuranics in 2022 as required for RGPP locations that were previously identified as elevated. U-233/234 and U-238 were detected in MW-PB-25 and MW-PB-27. The U-233/234 concentrations ranged from 0.6368 pCi/L (MW-PB-25) to 5.603 pCi/L (MW-PB-27). The U-238 concentrations ranged from 0.3184 pCi/L (MW-PB-25) to 2.287 pCi/L (MW-PB-27). Additionally, to satisfy the ANI request, the well with the highest average gross-alpha (dissolved) concentration (MW-PB-16) was analyzed for select transuranics during the

2nd quarter 2022. No select transuranics were detected in the sample collected from MW-PB-16. (Appendix E, Table E-7)

GammaEmitters

28 locations were analyzed for gamma emitting nuclides were performed in 2022, All results were below the required LLDs. (Appendix E, Table E–11)

Hard-To-Detect

HTD analyses were performed in 2022 on 6 groundwater locations. There were no detects and all results were below the required LLDs. (Appendix E, Table E-5)

B. Precipitation Sample Results

Tritium

Tritium activity was detected in 17 of 21 samples collected from 8 precipitation water locations. The concentrations ranged from below LLD, <176 pCi/L to 748 pCi/L. These concentrations are consistent with historical values observed. (Appendix E, Table E-10)

C. 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 2022[(4)]. The updated water well database search indicated a new water well off PBAPS property within a one mile radius. 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 2006-2022.

D. Summary of Results – Inter-Laboratory Comparison Program

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

E. Leaks, Spills and Releases

The 4th quarter sample collected from MW-PB-30 had a tritium concentration of 683 pCi/L. However, the tritium concentration increased to 19,100 pCi/L in a subsequent sample collected in the middle of December 2022.

Station personnel performed an investigation to identify the potential source of the elevated tritium concentrations in MW-PB-30.

Station personnel identified a steam leak in the Unit 2 Moisture Separator Room. The steam leak normally discharges to the atmosphere through the Station's monitored ventilation system. According to Station personnel, during heavier rain events, the roof drain piping, which passes through the Moisture Separator Room, becomes cold and liquid condenses from the humidity generated by the steam leak. The condensate pools within the Moisture Separator Room and flows to the sump within the room. Station personnel constructed a containment around the sump to stop condensate from entering the pit.

The Station will sample this well, as well as nearby wells MW-PB-29 and MW-PB-31, monthly to more closely monitor tritium concentrations in the area of this well. According to Station personnel, a tritium "Hit Team" was formed to evaluate potential tritium sources in the area of this well.

F. 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.

G. Investigations

MW-PB-4

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.

MW-PB-29, 30 and 31

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 2022. The third table lists the activity of the wells from the last sampling of 2022.

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	477	12/14/2022
MW-PB-25	17,100	12/14/2022
MW-PB-26	435	11/4/2022
MW-PB-27	775	12/14/2022

Well #	Tritium Activity	Date
MW-PB-24	477	12/14/2022
MW-PB-25	17,100	12/14/2022
MW-PB-26	356	12/14/2022
MW-PB-27	775	12/14/2022

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.

Monthly sampling of MW-PB-24, MW-PB-25, MW-PB-26, and MW-PB-27 was completed in 2022 to monitor tritium concentrations in the area of MW-PB-25. In 2022, the average tritium concentration in samples collected from MW-PB-25 was approximately 7,400 pCi/L. The Station will continue to sample MW-PB-25, as well as nearby wells MW-PB-24, MW-PB-26, and MW-PB27, on a monthly basis to monitor tritium concentrations in the area of MW-PB-25 and evaluate potential sources of the fluctuating tritium concentration in the area of the well.

<u>MW-PB-28</u>

Increased the monitoring frequency for MW-PB-28 in January of 2021 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.

H. Actions Taken

1. Installation of Monitoring Wells

   No new monitoring wells.

2. Actions to Recover/Reverse Plumes

   There were no actions to recover the plume.

3. 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 performing additional repairs to the moat in 2023.

   Results have stabilized and the well is no longer sampled on an increased frequency. No new actions were required to recover or reverse groundwater plumes in 2022.

I. Deviations and Enhancements

The data tables show that duplicate and split samples were obtained at several sample locations in 2022. 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 2022.
5. AMO Environmental Decisions, 2022 Annual RGPP Monitoring Report Summary of Results and Conclusions Peach Bottom Generating Station Delta, Pennsylvania.

TABLE OF CONTENTS - ANALYTICAL RESULTS

TABLE E-1

**Locations of Onsite Radiological Groundwater Protection Program
Peach Bottom Atomic Power Station, 2022**

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		

Figure E-2
Well Water Sample Locations for the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2022

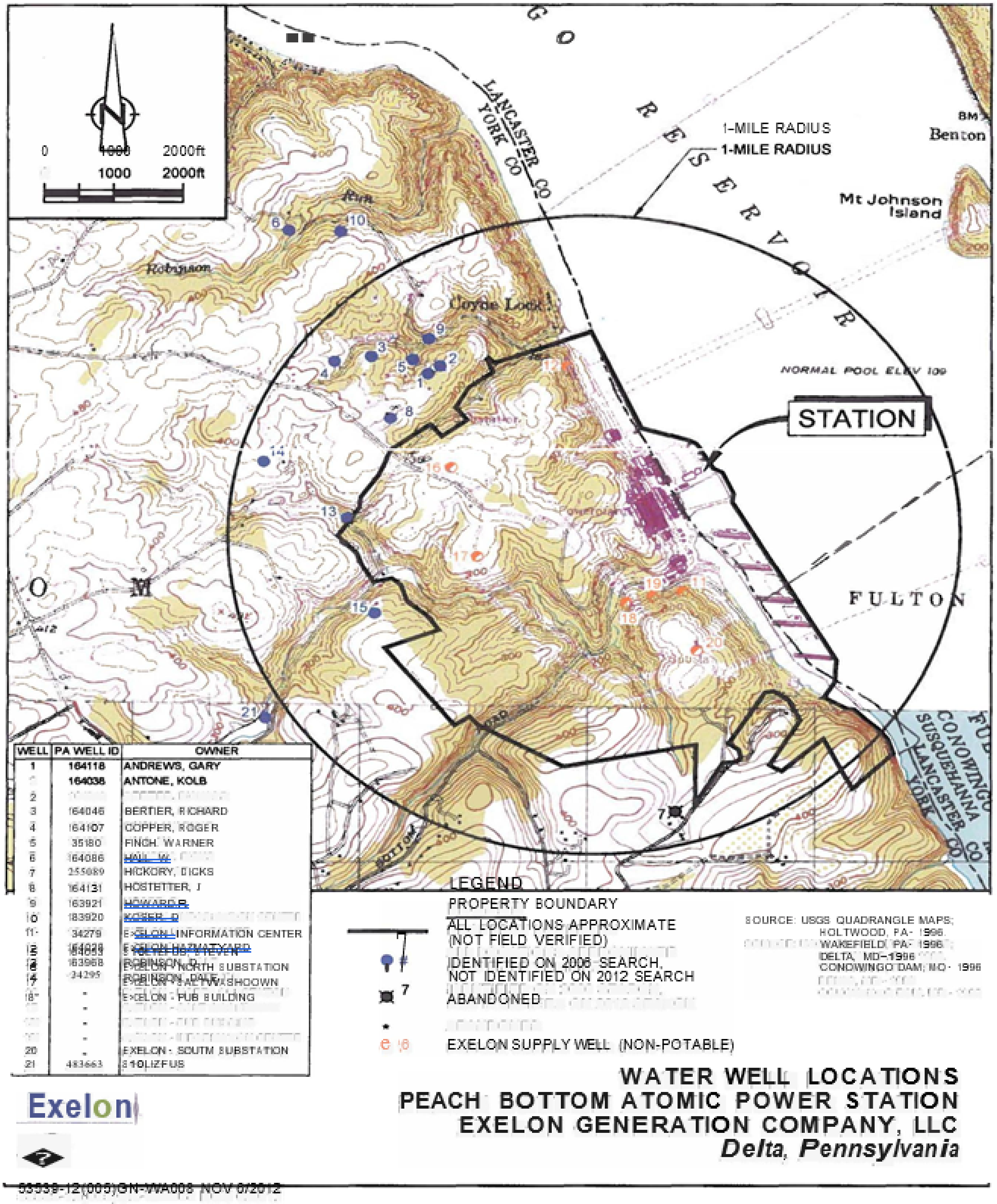


Figure E-3

Radiological Groundwater Protection Program Monitoring Locations
Peach Bottom Atomic Power Station, 2022

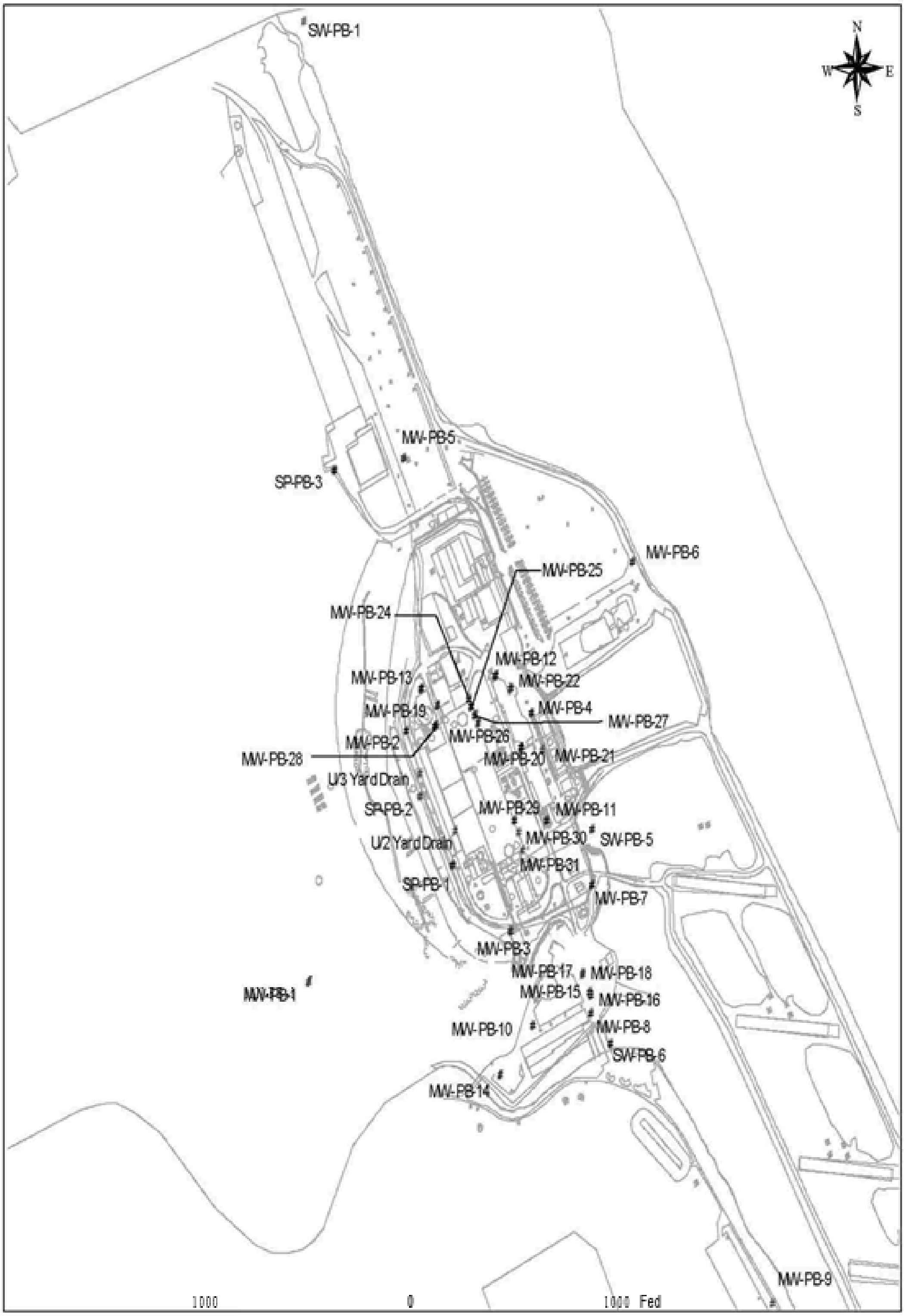
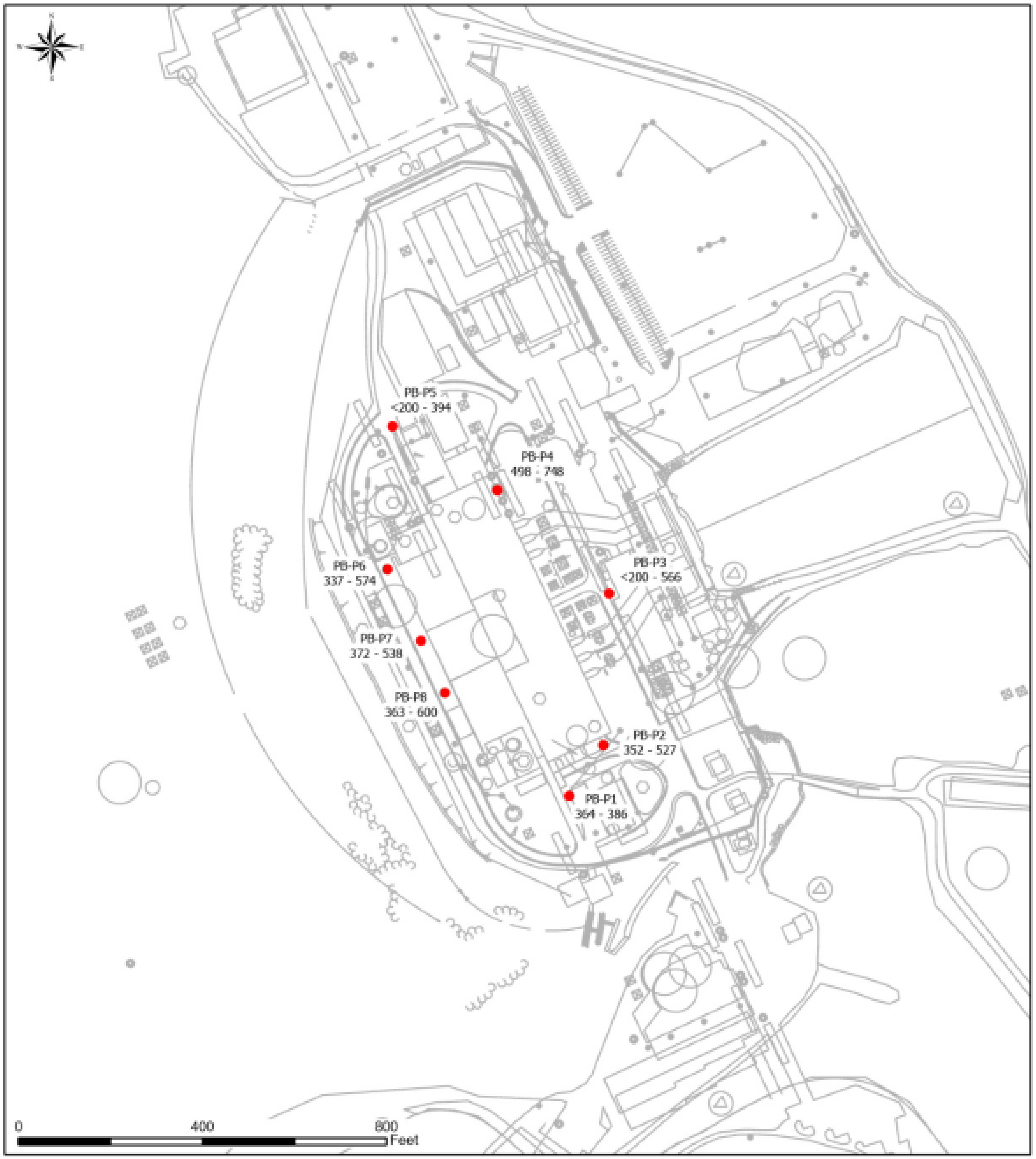


Figure E-4

Routine Precipitation Sample Locations for the Radiological Groundwater Protection Program, Peach Bottom Atomic Power Station, 2022



Explanation:
2022 Precipitation Recapture Sample Locations
● Result >200 pCi/L
- Precipitation recapture samples collected in January and July 2022.

Figure 3
2022 Precipitation Recapture
Sample Locations
Constellation Energy Corporation
Peach Bottom Generating Station

Table E-5

Hard to Detects in Groundwater
(Results in units of pCi/L ± 2σ)

Station	Sample Date	Fe-55	Ni-63
MW-PB-8	6/14/2022	<59.6	<4.34
MW-PB-8(Dup)	6/14/2022	<88	<4.53
MW-PB-8(Split)	6/14/2022	<99.3	<28.5
MW-PB-10	6/14/2022	<156.4	<4.77
MW-PB-15	6/14/2022	<167.8	<4.41
MW-PB-15(Dup)	6/14/2022	<161	<4.53
MW-PB-15(Split)	6/14/2022	<98.4	<28.3
MW-PB-16	6/14/2022	<91.7	<4.1
MW-PB-16(Dup)	6/14/2022	<155.8	<4.3
MW-PB-16(Split)	6/14/2022	<100	<29.6
MW-PB-25	6/15/2022	<191.1	<4.73
MW-PB-30	10/01/2022	<157.6	<4.65

Table E-6

Concentration of Radiostrontium in Groundwater
(Results in units of pCi/L ± 2σ)

Location	Sample Date	SR-89	SR-90
MW-PB-10	6/14/2022	< 6.84	< 0.882
MW-PB-15	6/14/2022	< 8.75	< 0.89
MW-PB-15(Dup)	6/14/2022	< 9.31	< 0.853
MW-PB-15(Split)	6/14/2022	< 1.4	< 0.932
MW-PB-16	6/14/2022	< 7.16	< 0.791
MW-PB-16(Dup)	6/14/2022	< 7.32	< 0.635
MW-PB-16(Split)	6/14/2022	< 1.67	< 0.947
MW-PB-19	6/14/2022	< 9.69	< 0.904
MW-PB-20	6/15/2022	< 9.42	< 0.896
MW-PB-25	6/15/2022	< 7.55	< 0.951
MW-PB-26	6/15/2022	< 8.99	< 0.994
MW-PB-27	6/15/2022	< 7.83	< 0.873
MW-PB-28	6/14/2022	< 7.26	< 0.836
MW-PB-29	6/15/2022	< 8.26	< 0.874
MW-PB-30	6/15/2022	< 7.61	< 0.854
MW-PB-30	10/1/2022	< 6.49	< 0.873
MW-PB-31	6/15/2022	< 7.28	< 0.902
MW-PB-8	6/14/2022	< 8.51	< 0.842
MW-PB-8(Dup)	6/14/2022	< 7.09	< 0.813
MW-PB-8(Split)	6/14/2022	< 1.28	< 0.974
Unit 2 YARD DRAIN	6/24/2022	< 8.97	< 0.795
Unit 3 YARD DRAIN	6/14/2022	< 8.22	< 0.858

Table E-7

Alpha Isotopic and Transuranics in Groundwater
(Results in units of pCi/L ± 2σ)

Station	Sample Date	AM-241 (AS)	CM-242 (AS)	CM-243/244 (AS)	PU-238 (AS)	PU-239/240 (AS)	U-233/234 (AS)	U-235 (AS)	U-238 (AS)
MW-PB-16	2/9/2022	< 0.1128	< 0.1117	< 0.1579	< 0.04658	< 0.1227	< 0.1659	< 0.1778	< 0.1439
MW-PB-16	6/14/2022	< 0.05428	< 0.07599	< 0.01862	< 0.04076	< 0.07593	< 0.06462	< 0.07988	< 0.09138
MW-PB-25	6/15/2022	< 0.04137	< 0.02282	< 0.1041	< 0.06502	< 0.09195	**0.6368±0.2799**	< 0.139	**0.3184±0.195**
MW-PB-27	6/15/2022	< 0.06071	< 0.02199	< 0.09156	< 0.0524	< 0.09762	**5.603±0.8468**	< 0.0981	2.287±0.4811
MW-PB-30	10/1/2022	< 0.134	< 0.03219	< 0.01932	< 0.02364	< 0.05569	< 0.02966	< 0.03666	< 0.1452

Table E-8

Gross Alpha Activity in Groundwater
(Results in units of pCi/L ± 2σ)

Location	Sample Date	Gross Alpha (Dissolved)	Gross Alpha (Suspended)
MW-PB-10	6/14/2022	< 0.94	3.04±1.14
MW-PB-15	6/14/2022	< 0.902	1.62±0.885
MW-PB-15(Dup)	6/14/2022	< 0.909	< 0.816
MW-PB-15(Split)	6/14/2022	< 2.92	NA
MW-PB-16	6/14/2022	6.23±1.3	25.7±3.16
MW-PB-16(Dup)	6/14/2022	8.0±1.35	29±3.25
MW-PB-16(Split)	6/14/2022	29.9±5.42	NA
MW-PB-19	6/14/2022	< 0.598	< 0.506
MW-PB-20	6/15/2022	< 3.8	0.978±0.626
MW-PB-25	6/15/2022	< 1.15	< 0.795
MW-PB-26	6/15/2022	1.82±0.73	< 0.787
MW-PB-27	6/15/2022	2.59±0.83	41.2±3.75
MW-PB-28	6/14/2022	< 0.545	2.21±1.05
MW-PB-29	6/15/2022	< 0.493	< 1.11
MW-PB-30	6/15/2022	< 0.459	2.09±1.07
MW-PB-31	6/15/2022	< 0.836	< 0.787
MW-PB-8	6/14/2022	< 1.12	2.97±1.12
MW-PB-8(Dup)	6/14/2022	< 0.934	1.97±0.96
MW-PB-8(Split)	6/14/2022	< 3.03	NA
Unit 2 YARD DRAIN	6/24/2022	< 0.783	< 0.816
Unit 3 YARD DRAIN	6/14/2022	< 0.602	< 1.01

Table E-9
Concentration of Tritium in Groundwater
(Results in units of pCi/L ± 2σ)

LOCATION	1/25/2022	1/28/2022	2/8/2022	2/9/2022	3/17/2022	6/14/2022	6/15/2022	6/24/2022	7/19/2022	8/18/2022	9/13/2022	9/14/2022	9/27/2022	10/1/2022	10/18/2022	11/4/2022	11/15/2022	11/16/2022	11/29/2022	12/14/202
Unit 2 Yard Drain	329±130	ND	ND	ND	ND	ND	ND	232±122	ND	ND	ND	ND	341±118	ND	ND	ND	ND	ND	<198	ND
Unit 3 Yard Drain	ND	ND	299±117	ND	ND	184±112	ND	ND	ND	ND	ND	403±128	ND	ND	ND	ND	ND	ND	ND	608±152
MW-PB-1	ND	ND	ND	ND	ND	ND	ND	ND	<192	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-2	ND	ND	ND	ND	ND	ND	<183	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-3	ND	ND	ND	ND	ND	ND	<174	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-4	ND	ND	ND	ND	ND	ND	<185	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	240±132	ND	ND
MW-PB-5	ND	ND	ND	ND	ND	ND	<188	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-6	ND	ND	ND	ND	ND	<176	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-7	ND	ND	ND	ND	ND	<183	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-8	ND	ND	ND	202±124	ND	200±124	ND	ND	ND	ND	<199	ND	ND	ND	ND	ND	ND	<195	ND	ND
MW-PB-8Dup	ND	ND	ND	<180	ND	<185	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<190	ND	ND
MW-PB-8Split	ND	ND	ND	<106	ND	<137	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<137	ND	ND
MW-PB-10	ND	ND	ND	<195	ND	<178	ND	ND	ND	ND	<186	ND	ND	ND	ND	ND	ND	<189	ND	ND
MW-PB-10Dup	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<188	ND	ND	ND	ND	ND	ND	<196	ND	ND
MW-PB-10Split	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<141	ND	ND	ND	ND	ND	ND	<144	ND	ND
MW-PB-12	ND	ND	ND	ND	ND	ND	393±132	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	386±130	ND	ND
MW-PB-13	ND	ND	ND	ND	ND	206±120	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	<189	ND	ND
MW-PB-15	ND	ND	ND	<181	ND	<178	ND	ND	ND	ND	<198	ND	ND	ND	ND	ND	ND	<190	ND	ND
MW-PB-15Dup	ND	ND	ND	<194	ND	<193	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-15 Split	ND	ND	ND	<163	ND	<115	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-16	ND	ND	ND	<182	ND	<177	ND	ND	ND	ND	<188	ND	ND	ND	ND	ND	ND	<186	ND	ND
MW-PB-16 Dup	ND	ND	ND	ND	ND	<190	ND	ND	ND	ND	<187	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-16 Split	ND	ND	ND	ND	ND	<114	ND	ND	ND	ND	<135	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW-PB-19	ND	ND	<174	ND	ND	182±118	ND	ND	ND	ND	ND	<194	ND	ND	ND	ND	<192	ND	ND	ND
MW-PB-20	ND	ND	<182	ND	ND	ND	<184	ND	ND	ND	ND	<198	ND	ND	ND	ND	<196	ND	ND	ND
MW-PB-22	ND	ND	ND	ND	ND	ND	281±131	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	270±126	ND	ND
MW-PB-24	ND	213±119	ND	212±116	334±131	ND	356±132	ND	199±118	223±132	ND	229±120	ND	ND	178±115	260±121	ND	ND	ND	477±143
MW-PB-25	ND	843±164	ND	994±167	767±162	ND	6170±678	ND	5730±629	2080±279	ND	4790±541	ND	ND	14800±1540	8340±883	ND	ND	ND	17100±17
MW-PB-25Dup	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	15800±16
MW-PB-25Dup	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	13100±13
MW-PB-26	ND	236±124	ND	380±120	372±139	ND	417±127	ND	242±128	288±130	ND	366±131	ND	ND	340±139	435±141	ND	ND	ND	356±137
MW-PB-27	ND	693±149	ND	769±155	693±162	ND	429±134	ND	423±134	283±132	ND	413±148	ND	ND	497±136	539±130	ND	ND	ND	775±170
MW-PB-28	ND	ND	313±131	ND	ND	197±121	ND	ND	ND	ND	ND	<190	ND	ND	ND	ND	204±127	ND	ND	ND
MW-PB-29	ND	ND	368±126	ND	ND	ND	327±125	ND	ND	ND	ND	488±139	ND	414±128	ND	ND	294±128	ND	ND	ND
MW-PB-30	ND	ND	193±125	ND	ND	ND	993±174	ND	ND	ND	ND	37300±3780	ND	563±141	ND	683±145	ND	ND	ND	18700±19
MW-PB-30Dup	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	19100±19
MW-PB-30Dup	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14600±15
MW-PB-31	ND	ND	<184	ND	ND	ND	190±119	ND	ND	ND	ND	<188	ND	218±135	ND	ND	260±131	ND	ND	ND

ND – No Data, Sample obtained as required
(Dup) –Sample analyzed in duplicate by TBE
(Split) –Additional sample collected and analyzed for Quality Assurance by GEL Laboratories

Table E-10

Concentration of Tritium in Precipitation and Subsurface Drainage

(Results in units of pCi/L ± 2σ)

LOCATION	2/9/2022	3/17/2022	6/14/2022	6/15/2022	9/13/2022	11/15/2022
PB-P1	ND	386±135	ND	ND	364±135	ND
PB-P2	ND	352±135	ND	ND	527±140	ND
PB-P3	ND	<176	ND	ND	566±148	ND
PB-P4	ND	498±130	ND	ND	748±167	ND
PB-P5	ND	199±112	ND	ND	394±148	ND
PB-P6	ND	337±127	ND	ND	574±156	ND
PB-P7	ND	372±127	ND	ND	538±160	ND
PB-P8	202±124	363±129	ND	ND	600±160	ND
SP-PB-1	ND	ND	ND	<176	ND	<194
SP-PB-2	ND	ND	<187	ND	ND	197±126

ND – No Data, Sample obtained as required

Table E-11

Gross Concentration of Gamma Emitters in Groundwater and Subsurface Drainage
(Results in units of pCi/L ± 2σ)

Location	Collection Date	Non Natural Gamma Emitters
MW-PB-6	6/14/2022	<MDA
MW-PB-15	6/14/2022	<MDA
MW-PB-15 Dup	6/14/2022	<MDA
MW-PB-15 Split	6/14/2022	<MDA
MW-PB-16	6/14/2022	<MDA
MW-PB-16 Dup	6/14/2022	<MDA
MW-PB-16 Split	6/14/2022	<MDA
MW-PB-8	6/14/2022	<MDA
MW-PB-8 Dup	6/14/2022	<MDA
MW-PB-8 Split	6/14/2022	<MDA
MW-PB-10	6/14/2022	<MDA
MW-PB-28	6/14/2022	<MDA
MW-PB-19	6/14/2022	<MDA
MW-PB-13	6/14/2022	<MDA
MW-PB-2	6/14/2022	<MDA
MW-PB-3	6/15/2022	<MDA
MW-PB-29	6/15/2022	<MDA
MW-PB-30	6/15/2022	<MDA
MW-PB-31	6/15/2022	<MDA
MW-PB-20	6/15/2022	<MDA
MW-PB-4	6/15/2022	<MDA
MW-PB-22	6/15/2022	<MDA
MW-PB-12	6/15/2022	<MDA
MW-PB-26	6/15/2022	<MDA
MW-PB-24	6/15/2022	<MDA
MW-PB-27	6/15/2022	<MDA
MW-PB-25	6/15/2022	<MDA
MW-PB-7	6/15/2022	<MDA
MW-PB-5	6/15/2022	<MDA
Unit 2 YARD DRAIN	6/24/2022	<MDA
Unit 3 YARD DRAIN	6/14/2022	<MDA
SP-PB-1	6/15/2022	<MDA
SP-PB-2	6/14/2022	<MDA
MW-PB-1	7/19/2022	<MDA
MW-PB-31	10/1/2022	<MDA
MW-PB-29	10/1/2022	<MDA
MW-PB-30	10/1/2022	<MDA

ND – No Data, Sample obtained as required
(Dup) – Sample analyzed in duplicate by TBE
(Split) – Additional sample collected and analyzed for Quality Assurance by GEL Laboratories
<MDA Minimum Detectable Activity, Lower Limit of Detection is Met