Constellation

Peach Bottom Atomic Power Station

2024

Annual Radiological Environmental Operating Report

Document Number: 50-171, 50-277, 50-278

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ATTACHMENTS

1.0 LIST OF ACRONYMS AND DEFINITIONS

1. Airborne Activity Sampling: Continuous sampling of air through the collection of particulates and radionuclides on filter media.

2. ARERR: Annual Radioactive Effluent Release Report

3. AREOR: Annual Radiological Environmental Operating Report

4. BWR: Boiling Water Reactor

5. Composite Sample: A series of single collected portions (aliquots) analyzed as one sample. The aliquots making up the sample are collected at time intervals that are very short compared to the composite period.

6. Control: A sampling station in a location not likely to be affected by plant effluents due to its distance and/or direction from the station.

7. Curie (Ci): A measure of radioactivity; equal to 3.7×10^{10} disintegrations per second, or 2.22×10^{12} disintegrations per minute.

8. Direct Radiation Monitoring: The measurement of radiation dose at various distances from the plant is assessed using Thermoluminescent Dosimeters (TLD), Optically Stimulated Luminescence Dosimeters (OSLD) and pressurized ionization chambers.

9. EPA: Environmental Protection Agency

10. GPI: Groundwater Protection Initiative

11. Grab Sample: A single discrete sample drawn at one point in time.

12. Indicator: A sampling location that is likely to be affected by plant effluents due to its proximity and/or direction from the plant.

13. Ingestion Pathway: The ingestion pathway includes milk, fish, drinking water and garden produce. Also sampled (under special circumstances) are other media such as vegetation or animal products when additional information about particular radionuclides is needed.

14. ISFSI: Independent Spent Fuel Storage Installation

15. Lower Limit of Detection (LLD): An *a priori* measure of the detection capability of a radiochemistry measurement based on instrument setup, calibration, background, decay time, and sample volume. An LLD is expressed as an activity concentration. The MDA is used for reporting results. LLD are specified by a regulator, such as the NRC and are typically listed in the ODCM.

16. MDA: Minimum Detectable Activity. For radiochemistry instruments, the MDA is the *a posteriori* minimum concentration that a counting system detects. The smallest concentration or activity of radioactive material in a sample that will yield a net count above instrument background and that is detected with 95% probability, with only five % probability of falsely concluding that a blank observation represents a true signal.

17. MDC: Minimum Detectable Concentration. Essentially synonymous with MDA for the purposes of radiological monitoring.

18. Mean: The sum of all of the values in a distribution divided by the number of values in the distribution, synonymous with average.

19. Microcurie: 3.7×10^4 disintegrations per second, or 2.22×10^6 disintegrations per minute.

20. N/A: Not Applicable

21. NEI: Nuclear Energy Institute

22. NIST: National Institute of Standards and Technology.

23. NRC: Nuclear Regulatory Commission

24. ODCM: Offsite Dose Calculation Manual

25. OSLD: Optically Stimulated Luminescence Dosimeter

26. pCi/L: picocuries / Liter

27. PWR: Pressurized Water Reactor

28. REMP: Radiological Environmental Monitoring Program

29. TLD: Thermoluminescent Dosimeter

2.0 EXECUTIVE SUMMARY

Peach Bottom Atomic Power Station Radiological Environmental Monitoring Program (REMP) was established prior to the station becoming operational to provide information on background radiation present in the area. The goal of PBAPS REMP is to evaluate the impact of the station on the environment. Environmental samples from different media are monitored as part of the program in accordance with specifications detailed in the Offsite Dose Calculation Manual (ODCM) and ODCM Specifications (ODCMS). The program compares data from Indicator locations near the plant to control locations farther away from the site to assess operation impacts.

The Annual Radiological Environmental Operating Report (AREOR) provides data obtained through analyses of environmental samples collected at PBAPS for the reporting period of January 1st through December 31st, 2024. During that time period 1608 analyses were performed on 1296 samples. In assessing all the data gathered for this report and comparing these results with preoperational data and/or 10-year average values, it was concluded that the operation of PBAPS did not result in detection of plant related radionuclides in the environment.

Results of OSLD measurements are listed in Attachment 4. 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, 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. Quarterly and Annual Normalized Net Dose for each location is reported in Attachment 4. 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. Detectable annual facility related dose was identified at the ISFSI dosimeter location, 1R, (described below). There is no detectable ambient gamma radiation to the members of the public due to PBAPS operations.

2.1 Summary of Conclusions:

No measurable activities above background levels were detected. All values were consistent with historical results which indicate no adverse radiological environmental impacts associated with the operation of PBAPS. Naturally occurring radionuclides are present in the Earth's crust and atmosphere and exists in detectable quantities throughout the world. It is common to detect naturally occurring radionuclides in many of the samples collected for REMP. Some examples of naturally occurring radionuclides that are frequently seen in samples are potassium-40, beryllium-7, actinium-228 (present as a decay product of radium-228), and radium-226. Additionally, some relatively long-lived anthropogenic radioisotopes, such as strontium-90 and cesium-137, are also seen in some REMP samples; these radionuclides exist in measurable quantities throughout the world as a result of fallout from historic atmospheric nuclear weapons testing and other nuclear events worldwide such as Fukushima and Chernobyl. Detailed information on the exposure of the U.S. population to ionizing radiation can be found in NCRP Report No. 160 [1].

In 2024, 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:

Table 1, Peach Bottom Clean Energy Center Units 2 and 3 Dose Summary

		Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
Liquid Effluents						
	Limit	**3 mrem**	**3 mrem**	**3 mrem**	**3 mrem**	**6 mrem**
	Total Body Dose	6.60E-06	3.05E-06	1.07E-04	3.99E-04	5.14E-04
	% Of Limit	2.20E-04	1.02E-04	3.56E-03	1.33E-02	8.57E-03
	Limit	**10 mrem**	**10 mrem**	**10 mrem**	**10 mrem**	**20 mrem**
	Maximum Organ Dose	6.61E-06	4.13E-06	1.17E-04	3.95E-04	5.22E-04
	% Of Limit	6.61E-05	4.13E-05	1.17E-03	3.95E-03	2.61E-03
Gaseous Effluents						
	Limit	**10 mrad**	**10 mrad**	**10 mrad**	**10 mrad**	**20 mrad**
	Gamma Air Dose	5.43E-03	3.48E-03	6.38E-05	1.93E-02	2.83E-02
	% Of Limit	5.43E-02	3.48E-02	6.38E-04	1.93E-01	1.41E-01
	Limit	**20 mrad**	**20 mrad**	**20 mrad**	**20 mrad**	**40 mrad**
	Beta Air Dose	3.69E-03	2.36E-03	1.40E-04	1.34E-02	1.96E-02
	% Of Limit	1.84E-02	1.18E-02	7.01E-04	6.68E-02	4.89E-02
	Limit	**5 mrem**	**5 mrem**	**5 mrem**	**5 mrem**	**10 mrem**
	NG Total Body Dose	5.25E-03	3.36E-03	6.14E-05	1.87E-02	2.74E-02
	% Of Limit	1.05E-01	6.73E-02	1.23E-03	3.74E-01	2.74E-01
	Limit	**15 mrem**	**15 mrem**	**15 mrem**	**15 mrem**	**30 mrem**
	NG Skin Dose	6.82E-03	4.37E-03	1.99E-04	2.46E-02	3.60E-02
	% Of Limit	4.55E-02	2.91E-02	1.33E-03	1.64E-01	1.20E-01
	Limit	**15 mrem**	**15 mrem**	**15 mrem**	**15 mrem**	**30 mrem**
	Maximum Organ Dose	2.31E-04	2.93E-04	2.49E-04	1.32E-02	1.40E-02
	% Of Limit	1.54E-03	1.95E-03	1.66E-03	8.80E-02	4.66E-02

Table 2, Total Annual Offsite-Dose Comparison to 40 CFR 190 Limits for PBCEC

	Whole Body	Thyroid	Max Other Organ
Gaseous	2.83E-02	4.13E-02	3.70E-02
Carbon-14	1.72E-02	1.72E-02	8.05E-02
Liquid	5.14E-04	5.06E-04	5.22E-04
Direct Shine	0	0	0
Other Nearby Facilities	0	0	0
Total Site Dose	**4.60E-02**	**5.90E-02**	**1.18E-01**
Limit	**25 mrem**	**75 mrem**	**25 mrem**
% of Limit	1.84E-01	7.87E-02	4.72E-01

3.0 INTRODUCTION

The Radiological Environmental Monitoring Program (REMP) provides data on measurable levels of radiation and radioactive materials in the environment. This program also evaluates the relationship between quantities of radioactive materials released from the plant and resultant doses to individuals from principal pathways of exposure. In this capacity, REMP provides a check on the effluent release program and dispersion modeling to ensure that concentrations in the environment due to radioactive effluents conform to the “As Low as Is Reasonably Achievable” (ALARA) design objectives of 10 CFR 50, Appendix I [2], and implements the requirements of Section IV.B.2 and IV.B.3 of Appendix I. REMP is designed to conform to the Nuclear Regulatory Commission (NRC) Regulatory Guide 4.1 [3], NUREG 1301/1302 [4] [5], and the 1979 NRC Branch Technical Position [6].

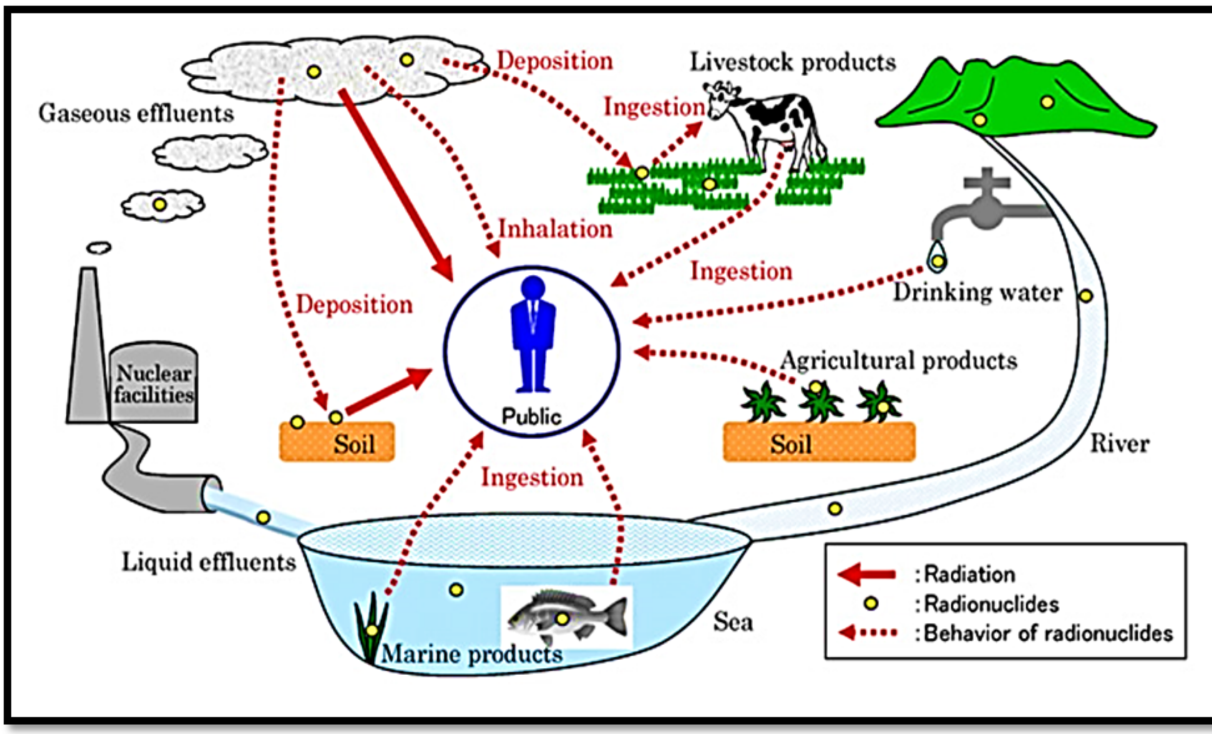

Figure 1, Potential exposure pathways to Members of the Public due to Plant Operations [7]

Quality assurance aspects of the sampling program and OSLD data collection are conducted in accordance with Regulatory Guides 4.15 [8] and 4.13 [9]. REMP also adheres to the requirements of PA, PBAPS Technical Specifications, and Offsite Dose Calculation Manual (ODCM). These governing documents dictate the environmental sampling, sample analysis protocols, data reporting and quality assurance requirements for the environmental monitoring program.

The Annual Radiological Environmental Operating Report provides summaries of the environmental data from exposure pathways, interpretations of the data, and analyses of trends of the results. Routinely monitored pathways include ingestion, inhalation, and direct radiation. Routes of exposure are based on site specific information such as meteorology, receptor locations, and water usage around the plant.

4.0 SITE DESCRIPTION AND SAMPLE LOCATIONS

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.

PBAPS sampling media are selected based on site specific information such as meteorology, receptor locations, and water usage around the plant. Sampling and analysis frequencies are documented in the Offsite Dose Calculation Manual and site procedures. Required sampling, analysis frequencies and location of sample collected are captured in the following tables and figures:

- Table 1, Radiological Environmental Monitoring Program – Direct Radiation
- Table 2, Radiological Environmental Monitoring Program – Airborne
- Table 3, Radiological Environmental Monitoring Program – Waterborne
- Table 4, Radiological Environmental Monitoring Program – Ingestion
- Table 5, REMP Sampling Locations – Direct Radiation
- Figure 2, REMP Sample Locations (Near Field/Site Boundary)
- Figure 3, REMP Sample Locations (Far Field)
- Figure 4, REMP Sample Locations (Onsite)

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REQUIREMENTS

Table 1, Radiological Environmental Monitoring Program – Direct Radiation

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
<u>Direct Radiation</u> At least 40 routine monitoring stations either with two or more dosimeters or with one instrument for measuring and recording dose rate continuously to be placed as follows: An inner ring of stations in the general area of the SITE BOUNDARY and an outer ring in the 3 to 6 mile range from the site. A station is in each sector of each ring except as dictated by local geography. The balance of the stations are in special interest areas such as population centers, nearby residences, schools, and in areas to service as control locations.	See Table 5	Quarterly (Every 92 days)	Gamma dose/Quarterly

Table 2, Radiological Environmental Monitoring Program – Airborne

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Airborne Radioiodine and Particulates Samples from 5 locations: 3 samples from close to the SITE BOUNDARY locations (in different sectors) of the highest calculated annual average ground level D/Q. 1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q. 1 sample from a control location unlikely to be affected by the plant.	1Z 1,500 feet SE of site 1A[^,QC] collocated with 1Z Weather Station #1 1B 2,500 feet NW of site Weather Station #2 1C 4,700 feet SSE of site South Sub Road 3A 19,300 feet SW of site Delta Station 5H2 [C] 162,400 feet NE of site Manor Substation (LGS)	Approximately 1 cfm continuous flow through glass fiber filter which is collected weekly. A TEDA impregnated flow-through cartridge is connected to air sampler and is collected weekly at site filter change. Continuous sampler operation with sample collection every 7 days or required by dust loading, whichever is more frequent.	Gross beta analysis on each weekly sample. Gamma spectrometry shall be done when gross beta exceeds ten times the yearly mean of control station value. Gross beta analysis done ≥24 hr. after sampling to allow for Radon and Thoron daughter decay. Gamma Spec on quarterly (92 days) composite by location. Radioiodine canisters: I-131 analysis every 7 days

[C] Indicates a Control location

[QC] Indicates a Quality Control duplicate sample location

[^] Indicates a sample location that is sampled and analyzed routinely, but is not listed as a sample location in the ODCM

Table 3, Radiological Environmental Monitoring Program – Waterborne

Requirement	**Sample Location Description, Distance, and Direction**	**Sampling Collection/ Frequency**	**Type and Frequency of Analyses**
Surface Water 1 sample upstream (control) and 1 sample downstream (indicator)	1LL [C] 1,200 feet ENE of site U2 and U3 Intake Composite 1MM 5,500 feet SE of site Canal Discharge	Sample collected from a continuous water sampler, monthly. In event, sampler is inoperable, grab samples will be collected each calendar day until sampler returned to service.	Gamma isotopic analysis monthly; H-3 on quarterly composite
Drinking Water 1 sample of each of 1 to 3 of the nearest water supplies that could be affected by its discharge. 1 sample from a control location.	4L 45,900 feet SE of site Conowingo Dam 6I [C] 30,500 feet NW of site Holtwood Dam 13B 13,300 feet ESE of site Susquehanna Pumping Station	Sample collected from a continuous water sampler, monthly. In event, sampler is inoperable, weekly grab samples will be collected until sampler returned to service.	Gross beta and gamma isotopic monthly, H-3 on quarterly composite
Sediment from Shoreline 1 sample from downstream area with existing or potential recreational value.	4J 7,400 feet SE of site Down River from Plant Discharge Area 4T[^] 41,800 feet SE of site Conowingo Pond near Conowingo Dam 6F[C^] 31,500 feet NW of site Holtwood Dam	A sediment sample is taken down stream of discharge semi-annually.	Gamma isotopic analysis of each sample

[C] Indicates a Control location

[^] Indicates a sample location that is sampled and analyzed routinely, but is not listed as a sample location in the ODCM

Table 4, Radiological Environmental Monitoring Program – Ingestion

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Milk: Samples from milking animals in 3 locations within 3 miles distance having the highest dose potential. 1 sample from milking animals at a control location (unlikely to be affected by the plant).	M-13F C 32,600 feet W of site	Sample of fresh milk is collected from each farm biweekly when cows are on pasture (April through October), monthly at other times.	I-131 analyses on each sample. Gamma isotopic analysis or Cs-134, Cs-137 by chemical separation quarterly
	M-11A 4,900 feet SW of site		
	M-7D 19,100 feet SE of site		
	M-15B 9,500 feet NW of site		
	M-4C 10,900 feet ENE of site		
	M-1C 15,000 feet N of site		
	M-3D[^] 18,500 feet NE of site	Sample of fresh milk is collected from each farm quarterly.	
	M-1F[^C] 46,100 feet N of site		
	M-3B[^] 10,500 feet NE of site		
	M-9G[^] 89,200 feet S of site		
	M-15G[^] 9,500 feet NW of site		

Table 4, Radiological Environmental Monitoring Program – Ingestion

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Fish and Invertebrates: 1 sample of each commercially and recreationally important species in vicinity of discharge point when available. 1 sample of same species in areas not influenced by plant discharge when available.	4 6,000-10,000 feet SE of site PBAPS Discharge Area 6 [C] 50,000-70,000 feet NNW of site Area not influenced by Plant Discharge	Two species of recreationally important fish (predator and bottom feeder) sampled in season or semiannually if not seasonal.	Gamma isotopic analyses on edible portions.
Food Products: Samples of 3 different kinds of broad leaf vegetation grown nearest offsite garden of highest annual average ground level D/Q if milk sampling is not performed. 1 sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction if milk sampling is not performed.	1C 4,700 feet SSE of site 55 [C] 51,900 feet NE of site 2Q^ 9,504 feet SW of site 3Q^ 9,504 feet SW of site	Samples of three (3) different kinds of broad leaf vegetation monthly when available if milk sampling is not performed.	Gamma isotopic and I-131 analysis

[C] Indicates a Control location

^ Indicates a sample location that is sampled and analyzed routinely, but is not listed as a sample location in the ODCM

Table 5, REMP Sampling Locations – Direct Radiation

Site #	Location Type	Sector	Distance	Description
1L	Inner ring	NE	1,100 feet	Just before intake building on pipe by shoreline
1A	Inner ring	SE	1,500 feet	Located at 1A air sample site on pole
2	Inner ring	SE	4,700 feet	Back corner of orchard walk thru woods to fenced cage at cliff's edge
1I	Inner ring	SSE	2,900 feet	Walk on left side of perimeter fence around south sub station located attached to fence
1C	Inner ring	SSE	4,700 feet	Located on pole at 1C air sample site
1J	Inner ring	S	4,000 feet	Follow field dirt road to top of field & woods, on left side at edge of woods on pole
1F	Inner ring	SSW	2,900 feet	Off Atom Rd. through gate, follow dirt rd. to top near powerlines inside fenced area on pole
40	Inner ring	SW	8,000 feet	Address 43 Atom Rd. behind house on end of wash line pole
1NN	Inner ring	WSW	2,700 feet	Drive past N. Substation on right maint. buildings drive past & on pole in field
1H	Inner ring	W	3,200 feet	At N. Substation drive thru gate & turn to right follow field road to pole on right
1G	Inner ring	WNW	3,100 feet	At N. Substation on left side of perimeter fence follow along fence to where attached to fence
1B	Inner ring	NW	2,500 feet	Located on pole at 1B air sample site
1E	Inner ring	NNW	3,000 feet	Onsite behind Dorsey Park boat launch inside fenced area on pole
1K	Inner ring	SW	4,700 feet	Off Booker Rd. Ben Blank milk farm behind house on pole
1P	Inner ring	ESE	2,200 feet	Onsite located on fence near shoreline by cooling tower #2
15	Outer ring	N	19,300 feet	Off Silver Spring Rd. turn right on dirt lane in field inside fenced area on pole
22	Outer ring	NNE	12,500 feet	Along Eagle Rd. under power line tower on pole just off roadway
44	Outer ring	NE	26,700 feet	Along Goshen Rd. on pole just off roadway
32	Outer ring	ENE	14,400 feet	Along Slate Hill Rd. inside fenced area on pole
45	Outer ring	ENE	18,500 feet	Along Peach Bottom Rd. up farm lane in field on leg of Power line tower – Keeney Line
14	Outer ring	E	10,300 feet	Along Peters Creek Rd. on right inside fenced area on pole
17	Outer ring	ESE	21,500 feet	Along Riverview Rd. in field inside fenced area on pole
31A	Outer ring	SE	24,100 feet	Along dirt Rd. Eckerman Rd. on left side on pole
4K	Outer ring	SE	45,900 feet	On rooftop on West side of Conowingo Dam
23	Outer ring	SSE	5,500 feet	Off Burke Rd. turn into driveway & proceed into orchard located on pole near water tower

Table 5, REMP Sampling Locations – Direct Radiation

Site #	Location Type	Sector	Distance	Description
27	Outer ring	S	14,400 feet	Along Cooper dirt Rd. along field edge on pole
48	Outer ring	SSW	26,500 feet	Along Route 136 Substation in Md. behind station in grass on pole
3A	Outer ring	SW	19,300 feet	Located on pole outside of fenced area for 3A air station in Delta
49	Outer ring	WSW	21,500 feet	Along Route 74 S. turn onto September Lane follow dirt rd. to pole on right side along edge of field
50	Outer ring	W	26,400 feet	Along Route 851 W. to Trans Pipeline on left side of road outside of fence on a pole
51	Outer ring	WNW	21,000 feet	Along McKinley Rd. on fence at Sub Station
26	Outer ring	NW	21,800 feet	Along Slab Rd. park on right in field follow field fence line to Power Line Tower on leg of tower
6B	Outer ring	NW	30,400 feet	At Holtwood Dam on rooftop of original powerhouse
42	Outer ring	NNW	21,500 feet	Across from Muddy Run Plant driveway located on fence along this driveway
43	Special interest	NNE	26,200 feet	Behind Rental business follow farm lane to pole on left
5	Special interest	E	24,400 feet	Near Wakefield off Pilottown Rd. inside fenced area on pole
16	Special interest	E	67,100 feet	Nottingham Substation on right side on pole
24	Special interest	ESE	58,200 feet	Harris Substation toward left side on fence
2B	Special interest	SSE	3,900 feet	870 Burke Rd. follow lane to house off left side of yard on T-pole
46	Special interest	SSE	23,800 feet	Off Flintville Rd. turn onto Bryce Lane dirt Rd. follow to pole on right side of lane
47	Special interest	S	22,700 feet	Off Susquehanna Hall Rd. turn into Scout camp take first dirt rd. on left follow to fence where attached
18	Special interest	W	52,200 feet	Near Fawn Grove Reid's residence on pole in driveway
19[C]	Special interest	WNW	124,000 feet	Red Lion, Pa. along Railwood Lane/Alley on T-pole
1T	Special interest	WNW	3,100 feet	Along Lay Rd. near P.B. nuclear plant on T-pole near house

[C] Control location

6.0 MAPS OF COLLECTION SITES

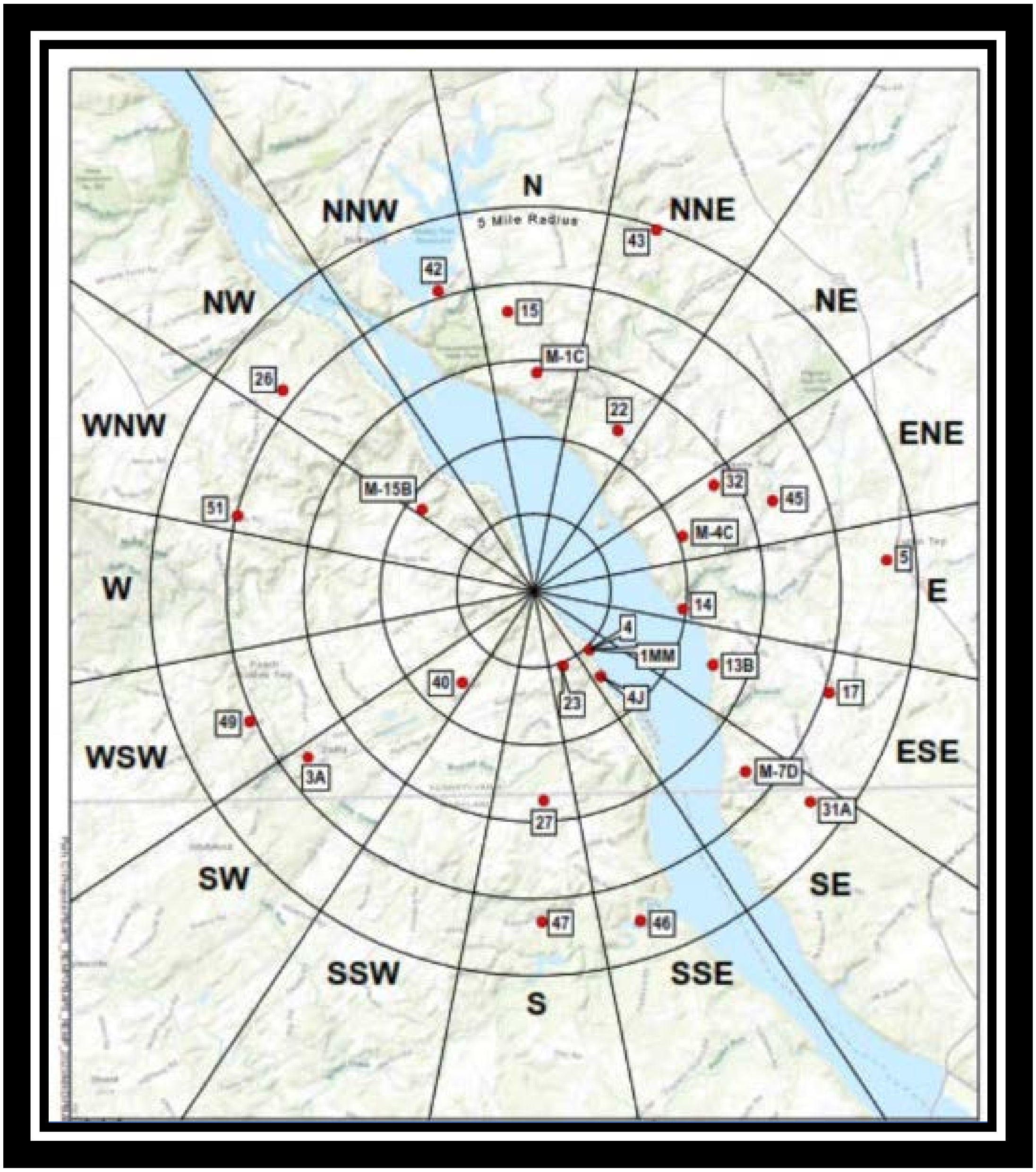

Figure 2, REMP Sample Locations (Near Field/Site Boundary)

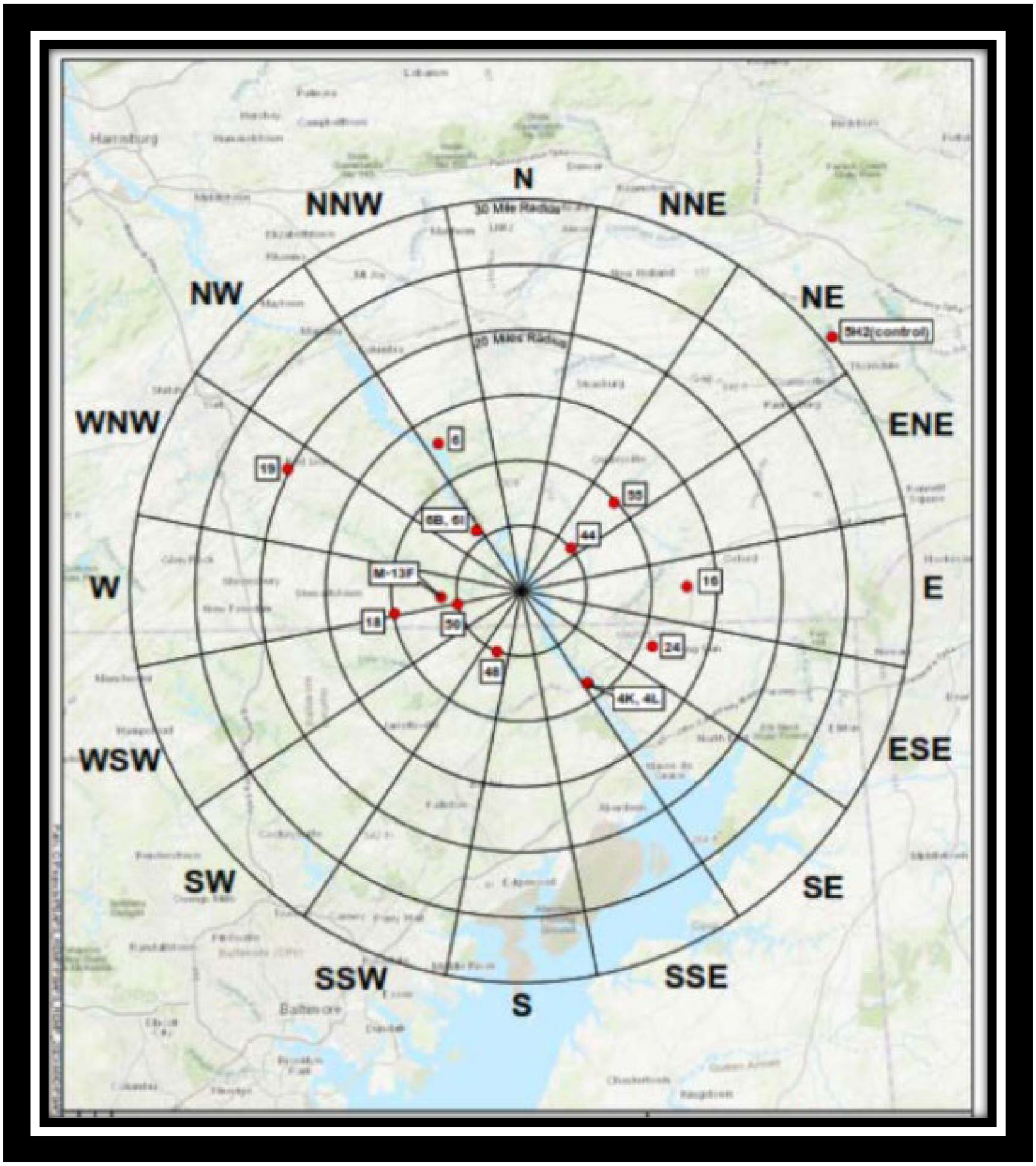

Figure 3, REMP Sample Locations (Far Field)

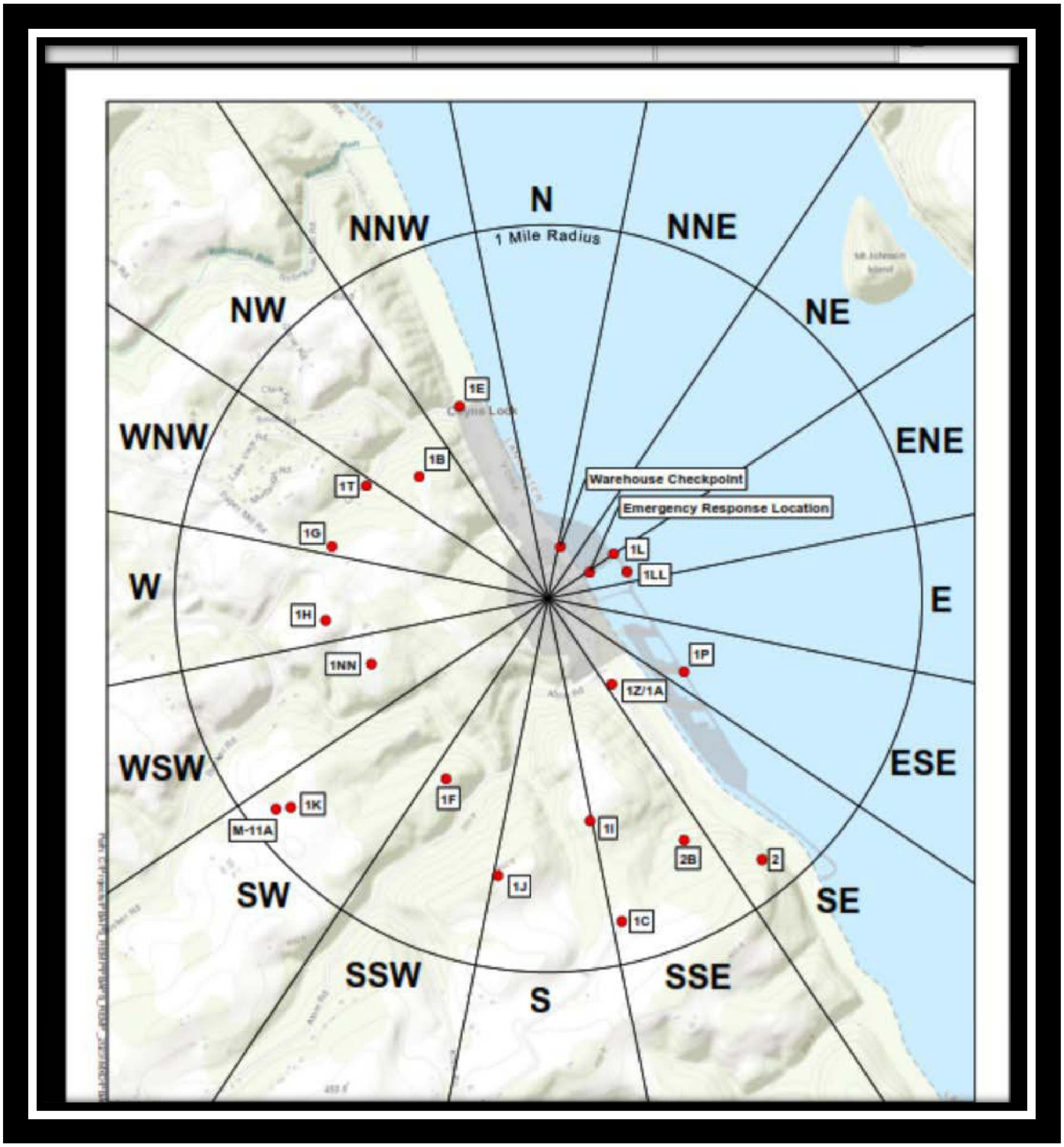

Figure 4, REMP Sample Locations (Onsite)

7.0 REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Table 6, Reporting Levels for Radioactivity Concentrations in Environmental Samples

Radionuclide	Water (pCi/L)	Air Particulates or Gases (pCi/m^3)	Fish (pCi/Kg-wet)	Milk (pCi/L)	Food Products (pCi/Kg-wet)
H-3	20,000 [1]				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2 [2]	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

Table 7, Maximum Values for the Limit of Detection

Radionuclide	Water (pCi/L)	Air Particulates or Gases (pCi/m^3)	Fish (pCi/Kg-wet)	Milk (pCi/L)	Food Products (pCi/Kg-wet)	Sediment (pCi/Kg-dry)
Gross Beta	4.0	0.01				
H-3	2,000 [3]					
Mn-54	15		130			
Fe-59	30		260			
Co-58, Co-60	15		130			
Zn-65	30		260			
Zr-95, Nb-95	30, 15					
I-131	1 [4]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-140, La-140	60, 15			15		

[1] **For** drinking water samples: **If** no drinking water pathway exists, a value **of 30,000 pCi/L** may be used.
[2] **If** no drinking water pathway exists, a value of 20 pCi/l may be used
[3] **If** no drinking water pathway exists, a value **of 3,000 pCi/L** may be used. Some states may require a lower LLD for drinking water sources- per 40 CFR 141 Safe drinking water ACT.
[4] **If** no drinking water pathway exists, a value of 15 pCi/l may be used

8.0 SAMPLING PROGRAM, PROGRAM MODIFICATION AND INTEPRETATION OF RESULTS

At most nuclear stations, data was collected prior to plant operation to determine background radioactivity levels in the environment. Annual data is routinely compared to preoperational and/or 10-year average values to determine if changes in the environs are present. Strict comparison is difficult to make due to fallout from historical nuclear weapon testing. Cesium-137 can be routinely found in environmental samples as a results of above ground nuclear weapons testing. It is important to note, levels of Cs-137 in environment are observed to fluctuate, for example as silt distributions shift due to natural erosion and transport processes, Cs-137 may or may not be observed in sediment samples.

In the following sections, results from direct radiation, air, water, and food products analyzed as part of REMP in 2024 will be discussed. Sampling program descriptions and deviations will also be discussed.

8.1 Environmental Direct Radiation Dosimetry Results

Dose is measured as net exposure (field reading less transit reading) normalized to 91-day quarters. Data is treated and analyzed consistent with ANSI/HPS N13.37-2014, which compares the measured dose for each location to the baseline background dose for that location. Environmental dose rates vary by location, depending on geological and land use considerations, and remain relatively constant for any given location (unless land use changes). Some facilities observe seasonal variation in environmental doses. Baseline Background Doses have been determined for both quarterly and annual measurements at each location using historical field measurements.

ANSI/HPS N13.37-2014 uses the concept of minimum differential dose (MDD), which is the minimum facility-related dose that can be detected above background. Due to natural background variations and measurement sensitivities and uncertainties, minimum differential dose is not zero. MDD is calculated based on statistical performance of the dosimetry system in the environment and is site specific.

Normalized doses that exceed the Minimum Differential Dose value above the Baseline Background Dose are considered to indicate Facility-Related Dose; a quality assurance review is performed to verify that any results indicating Facility-Related Dose are accurate.

During the calendar year 2024, a total of 48 locations were monitored and data analyzed in accordance with the requirements in Table 1, Radiological Environmental Monitoring Program – Direct Radiation. Attachment 4, Environmental Direct Radiation Dosimetry Results, provides the annual direct radiation dosimetry analysis.

8.2 Air Particulate and Radioiodine Sample Results

Air particulate filters and charcoal canisters were collected from locations specified in Table 1, Radiological Environmental Monitoring Program – Direct Radiation. During the calendar year 2024, a total of 265 samples were collected and analyzed for gross beta, gamma emitters and iodine. Particulate samplers are used to continuously collect airborne particulates on a filter. The samples are analyzed for gross beta activity following filter changeout which occurs weekly. Gamma isotopic analysis is also performed on the samples collected at each location and is analyzed quarterly. Radioiodine (I-131) analysis is performed weekly on radioiodine sample cartridges.

Air particulate samples were analyzed for concentrations of gross beta and gamma-emitting nuclides. Gross beta and cosmogenic naturally occurring beryllium-7 (Be-7) were detected at levels consistent with those detected in previous years. No fission or activation products were detected. High-sensitivity I-131 analyses were performed on weekly air samples. All I-131 results were less than minimum detectable activity. Gross Beta results are plotted in Figure 5, below.

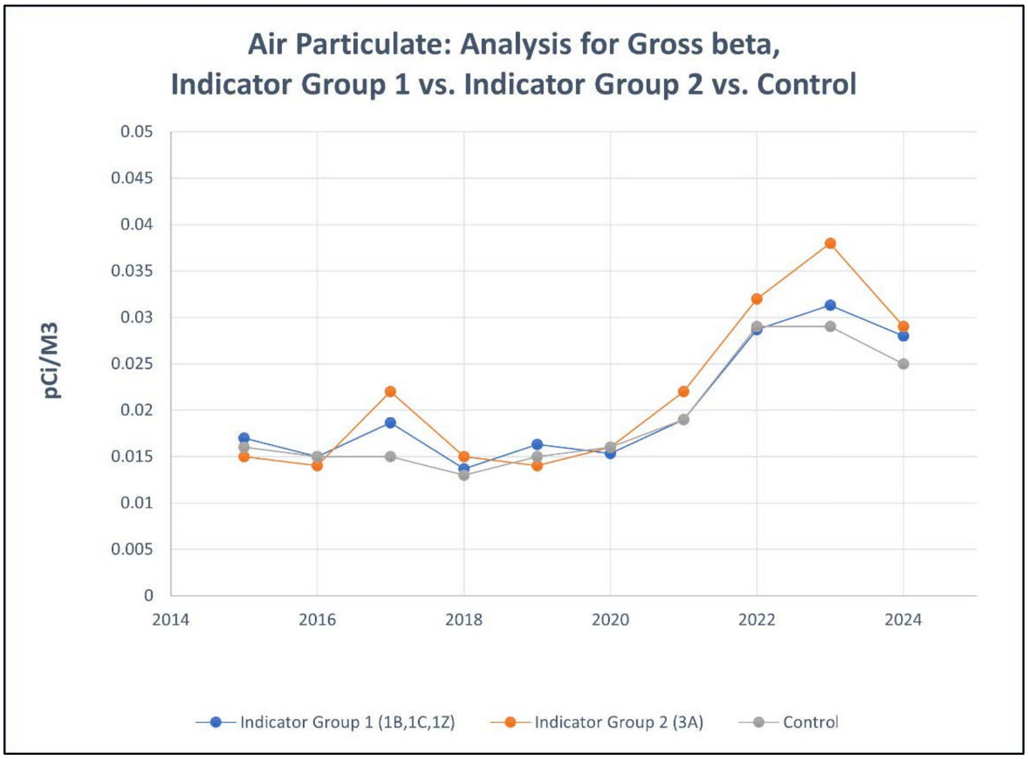

Figure 5: Air Particulate: Analysis for Gross Beta, Indicator Group 1 vs. Indicator Group 2 vs. Control Location

Air particulate and radioiodine results from this monitoring period, 2024, were compared to 10 year average as shown in Figure 5, and there were no significant changes.

8.3 **Waterborne Sample Results**

8.3.1 Surface Water (i.e., Bay, Lake etc.)

Composite water samples are collected monthly at the upstream control location and at the downstream indicator locations. Monthly composite samples are analyzed for gamma emitters. Aliquots from the monthly composites are combined to form a quarterly composite which is then analyzed for tritium. During the calendar year 2024, a total of 24 surface water samples were collected and analyzed in accordance with the requirements in the ODCM and shown in Table 3, Radiological Environmental Monitoring Program – Waterborne. Tritium concentrations in surface water were well below the EPA tritium drinking water limit of 20,000 pCi/L.

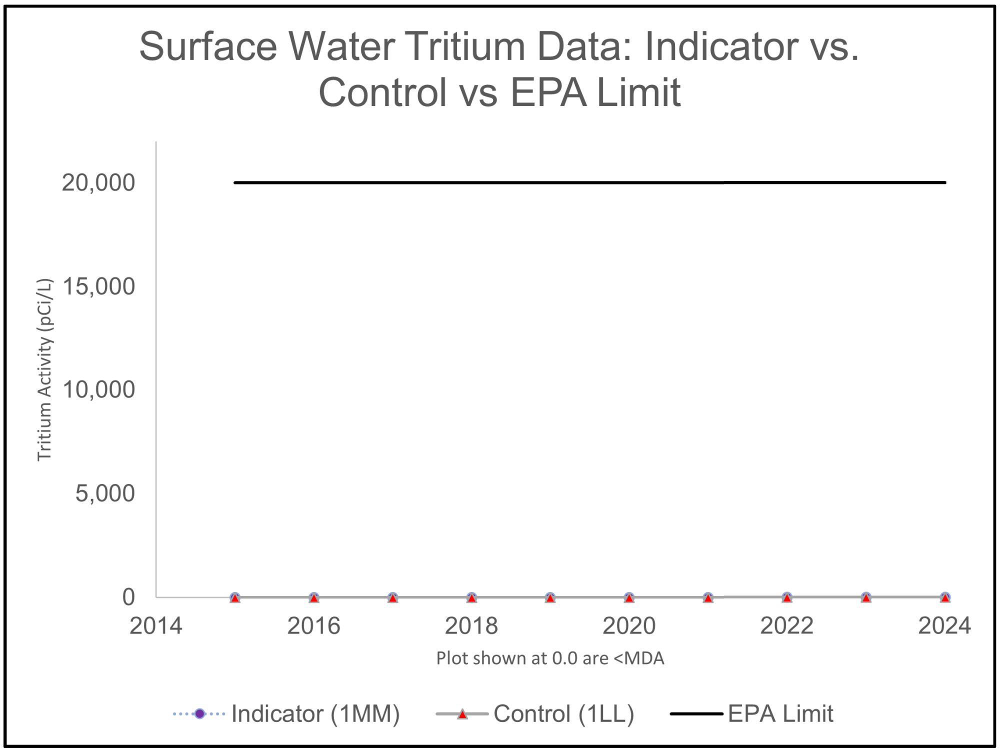

Figure 6, Surface Water Tritium Results, Indicator vs. Control vs EPA Limit

8.3.2 Beta Analysis Comparison; CGS vs. TBE 2024

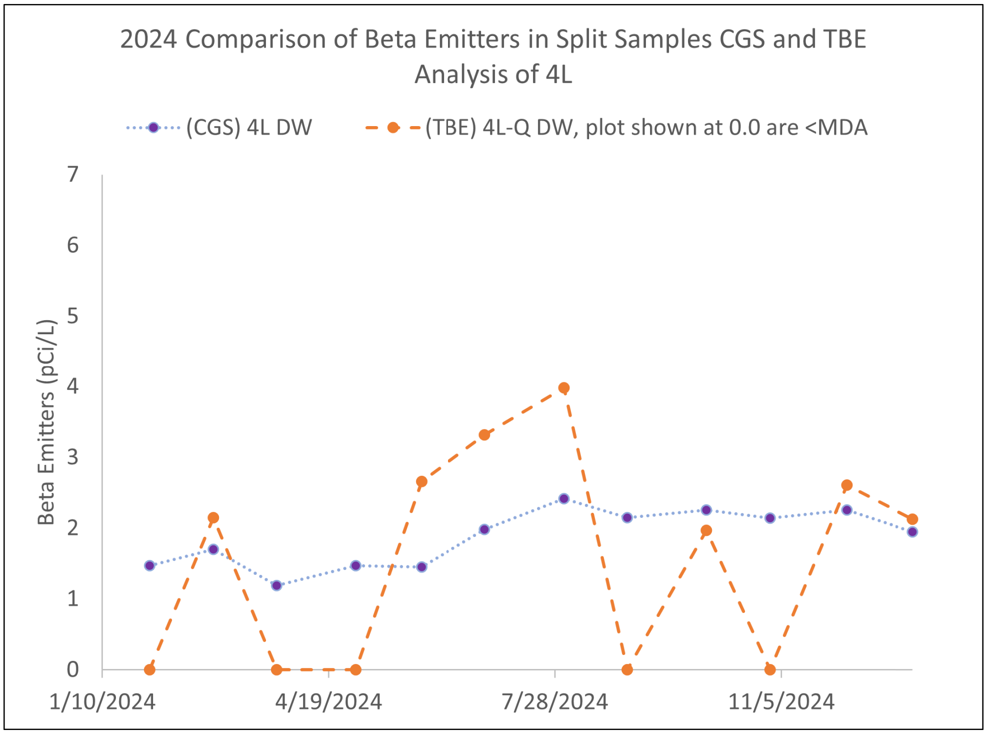

Figure 7, Comparison of Beta Emitters in Split Samples CGS and TBE Analysis

8.3.3 Drinking Water

A total of 36 drinking water samples were obtained in 2024. These samples were analyzed for gross beta, low level iodine, and gamma analysis monthly. These samples were analyzed for tritium quarterly in accordance with requirements in the ODCM and shown in Table 3, Radiological Environmental Monitoring Program – Waterborne. Total gross beta activities detected were consistent with those detected in previous years. No other fission or activation products were detected. Tritium concentrations in drinking water were less than MDA, thus far below the EPA tritium drinking water limit of 20,000 pCi/L.

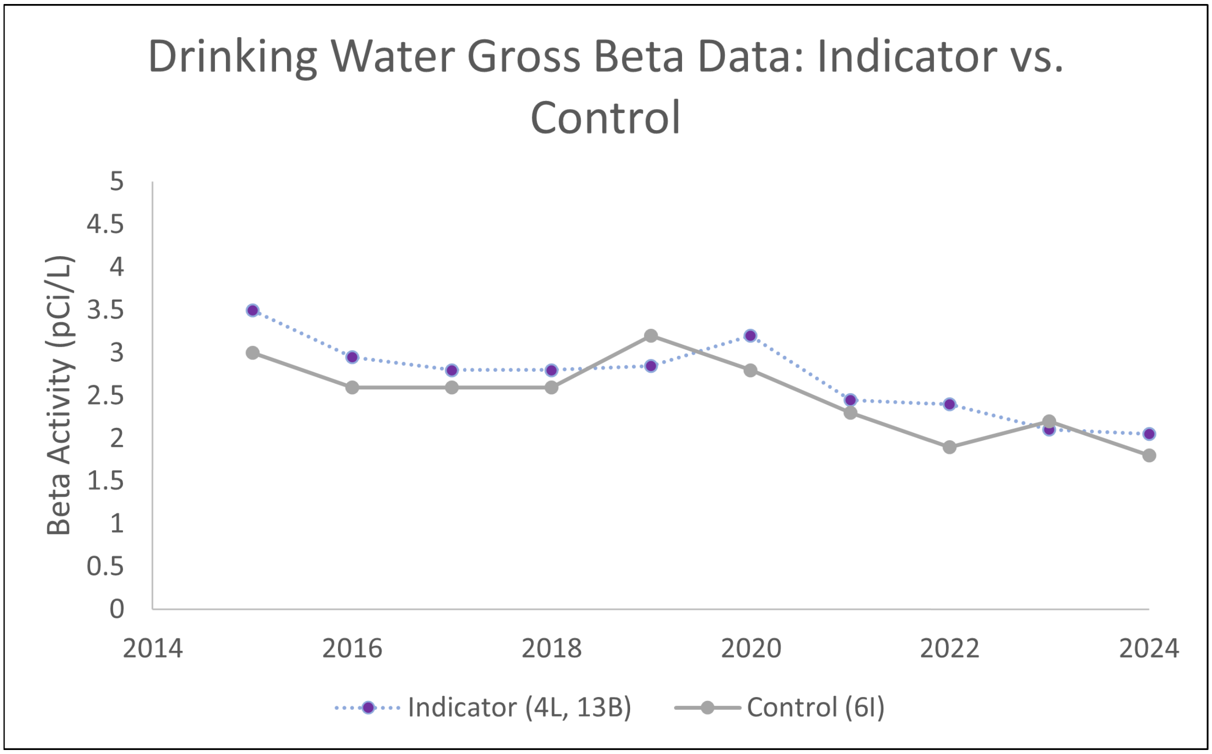

Figure 8, Drinking Water Gross Beta Samples Control vs. Indicator Comparison

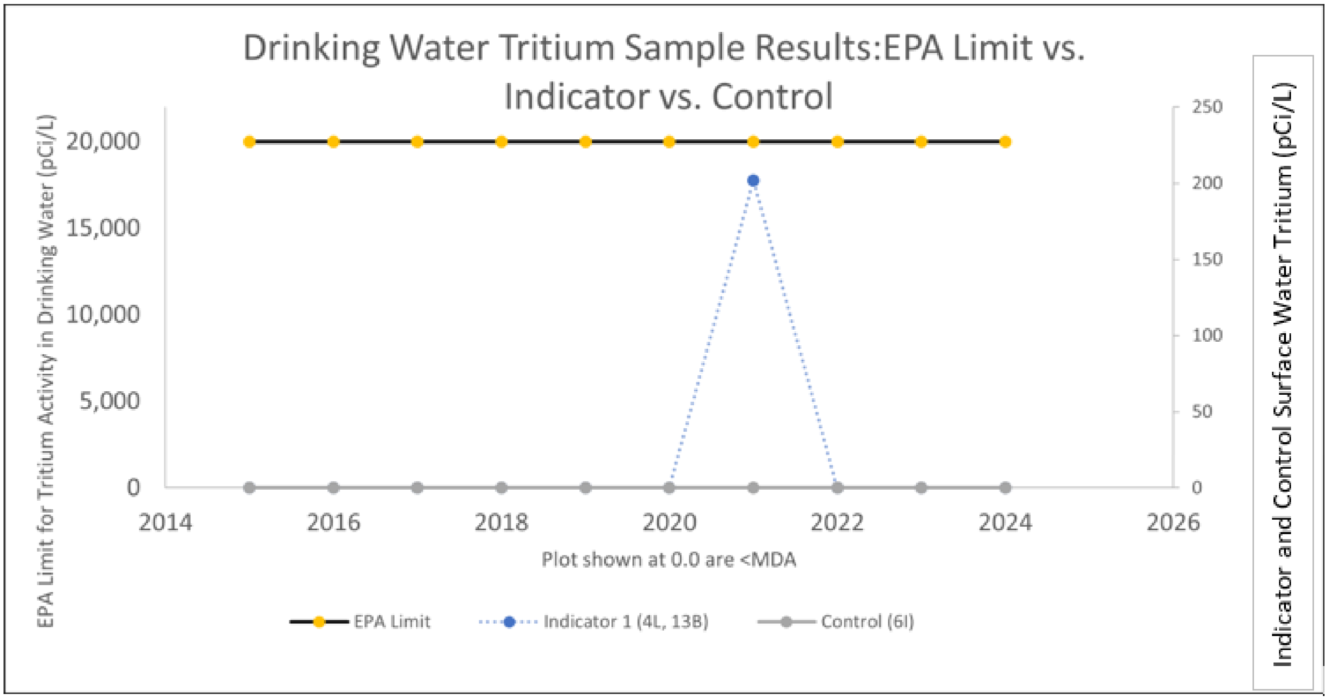

Figure 9, Drinking Water Tritium Sample Results: EPA Limit vs Indicator vs Control

8.3.4 Sediment from Shoreline

Shoreline sediment collections were made in May and November of 2024 and analyzed for gamma-emitting isotopes. Samples are collected at both indicator and control locations. A total of 6 shoreline samples were analyzed in accordance with requirements in the ODCM and shown in Table 3, Radiological Environmental Monitoring Program – Waterborne.

Sediment samples from all locations were analyzed for gamma-emitting nuclides. All analyses met minimum detectable activities. No fission or activation products were detected.

8.4 Ingestion Pathway Sample Results

8.4.1 Milk

Milk samples from milking animals were collected at 5 locations within 5 km having the highest dose potential, along with samples collected from a control location 15-30 km in the least prevalent wind direction. Samples were collected and analyzed monthly when cows were not on pasture and biweekly when cows were on pasture. Samples were analyzed for low level iodine and gamma-emitting nuclides. Samples were also collected and analyzed quarterly from 5 additional milk locations. Concentrations of naturally occurring potasssium-40 were consistent with those detected in previous years. No fission or activation products were found.

8.4.2 Fish and Invertebrates

A total of 8 fish samples were collected in 2024. These samples were analyzed for gamma emitting radionuclides in edible portions, in accordance with requirements of the ODCM and summarized in Table 4, Radiological Environmental Monitoring Program – Ingestion. These samples are collected from the indicator and control areas as required by the ODCM (with a bottom feeder species and a predator species collected at each location). All non-natural gamma emitters were less than the minimal detectable activity. Concentrations of naturally occurring potassium-40 (K-40) were consistent with those detected in previous years.

8.4.3 Food Products

A total of 48 vegetation samples were analyzed in 2024 for gamma emitting radionuclides in accordance with requirements of the ODCM, as summarized in Table 4, Radiological Environmental Monitoring Program – Ingestion.

8.4.4 Leafy Vegetation

In accordance with the ODCM and as described in Table 4, Radiological Environmental Monitoring Program – Ingestion, 48 broad leaf vegetation samples were collected from growing locations nearest site boundary in areas of highest predicted annual average ground level D/Q. Samples are collected and analyzed for gamma isotopic activity from the indicator and control locations monthly during growing season. It is common to detect Cs-137 in broadleaf samples at both indicator and control locations. Cs-137 can be attributed to offsite sources such as weapons testing, Chernobyl, and Fukushima events. All non-natural gamma emitters were less than the minimal detectable activity.

9.0 LAND USE CENSUS

An annual land use census is required by the Offsite Dose Calculation Manual and is performed to ensure that changes in the use of areas at or beyond the site boundary are identified and modifications to REMP are made if required by changes in land use. The land use census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR 50 [1]. NUREG-1302 Control 3.12.2 specifies that "a Land Use Census shall be conducted and shall identify within a distance of 8 km (5 mi.) the location in each of the 16 meteorological sectors of the nearest milk animal, the nearest residence and the nearest garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation. Note, per NUREG-1302, broad leaf vegetation sampling of at least three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census.

A Land Use Census was conducted during the calendar year 2024, within the growing season, to identify changes in land use, receptor locations, and new exposure pathways. The results for the 2024 Land Use Census are listed in Table 8: Land Use Census – Nearest Receptors within 5 miles. The nearest gardens in all other sectors reported in the 2024 report are the same as the previous year's report.

Table 8, Land Use Census – Nearest Receptors within 5 miles

Sector	Direction	Nearest Residence (Miles)	Nearest Garden[(1)] (Miles)	Nearest Dairy Animal (Miles)
A	N	2.34	2.69	2.69
B	NNE	2.10	2.09	2.05
C	NE	1.91	1.89	1.99
D	ENE	1.99	2.35	2.07*
E	E	1.91	2.74	2.74
F	ESE	3.05	3.62	3.82
G	SE	2.04	2.04	3.62*
H	SSE	0.74	0.74	Not Found in Sector
J	S	1.05	1.05	Not Found in Sector
K	SSW	1.15	1.11	2.20
L	SW	0.90	0.92	0.92*
M	WSW	0.76	1.72	Not Found in Sector
N	W	0.80	0.80	1.84
P	WNW	0.55	0.79	4.19
Q	NW	0.56	0.91	1.81
R	NNW	0.97	Not Found in Sector	Not Found in Sector

(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

10.0 SAMPLE DEVIATIONS, ANOMALIES AND UNAVAILABILITY

Sampling and analysis are performed for media types addressed in the Offsite Dose Calculation Manual. Sampling and analysis challenges may be experienced due to a multitude of reasons including environmental factors, loss of TLDs/OSLDs, contamination of samples, etc. To aid classification of sampling and analysis challenges experienced in 2024, the following three terms are used to describe the issues: Sample Anomalies, Sample Deviation, and Unavailable Samples.

Media that experienced downtime (i.e., air samplers or water samplers) during a surveillance period are classified a "Sample Deviation". "Sample Anomalies" are defined as errors that were introduced to a sample once it arrived in the laboratory, errors that prevents the sample from being analyzed as it normally would or may have altered the outcome of the analysis (i.e., cross contamination, human error).

"Sample Unavailability" is defined as sample collection with no available sample (i.e., food crop, TLD).

All required samples were collected and analyzed as scheduled except for the following:

Table 9, Sample Deviation Summary

Sample Type and Analysis	Location	Collection Date or Period	Reason for not conducting REMP sampling as required by ODCM	Plans for preventing reoccurrence
Air Particulate and Iodine Cartridge	1C	1/18/24	Moisture in the rotameter on the pump; calculated volume of 71.6 m3.	Air pump was replaced and sampler was returned to operation
Air Particulate and Iodine Cartridge	1Z	5/30/24	GFI outlet tripped which caused sample location to have less than required run time hours. The QA collocated air sampler location (1A) was collected and analyzed for credit instead of the 1Z sample.	The GFI outlet was reset and pump was restarted with no further issues.

11.0 OTHER SUPPLEMENTAL INFORMATION

11.1 NEI 07-07 Onsite Radiological Groundwater Monitoring Program

Peach Bottom Atomic Power Station has developed a Groundwater Protection Initiative (GPI) program in accordance with NEI 07-07, Industry Ground Water Protection Initiative – Final Guidance Document. The purpose of the GPI is to ensure timely detection and an effective response to situations involving inadvertent radiological releases to groundwater in order to prevent migration of licensed radioactive material off-site and to quantify impacts on decommissioning. It is important to note that samples and results taken in support of NEI 07-07 on-site groundwater monitoring program are separate from the Radiological Environmental Monitoring Program (REMP). See Attachment 5.

11.2 Independent Spent Fuel Storage Installation (ISFSI) Monitoring Program

In 2023, an evaluation of the background data set for all dosimeters was completed to determine if any changes were required. It was determined the background for dosimeter 1R should be updated. Due to casks being on the ISFSI pad, the dose for this location is elevated and not suitable to be used for the background. Pre-operational dose studies did not use dosimeters that are comparable to OSLDs, therefore, the background of the surrounding dosimeter locations were reviewed, and an average of those backgrounds was applied to the 1R calculations. Detectable facility-related dose at 1R was identified as expected following the change. No annual facility dose was detected at any surrounding dosimeters.

11.3 Corrections to Previous Reports

N/A

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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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e. TBE-2013 Radionickel Activity in Various Matrices
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b. GL-RAD-A-022 Ni-63
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Attachment 1, Data Table Summary

Medium or Pathway Sampled (Units)	Type, Total Number of Analyses performed (e.g., I-131, 400)	Lower Limit of Detection (LLD)	Indicator Mean[5]; (f[6]). Range[1]	Location with Highest Annual Mean		Control Mean[1] (f[2]). Range[1]	Number of Nonroutine Reported Measurements
				Name Distance and Direction	Mean[1] (f[2]) Range[1]		
Air Particulates (pCi/m³)	Beta, 265	(0.01)	2.84E-02 (1.00E-02-5.99E-02) (212/212)	1Z	2.90E-02 (1.27E-02-5.71E-02) (53/53)	2.49E-02 (9.20E-03-4.15E-02) (53/53)	0
Direct Radiation (mrem/qtr.)	Gamma Dose, 384	N/A	20.2 (8.8-31.9) (376/376)	1R ISFSI Pad	29.4 (25.9-31.9) (8/8)	14.4 (11.9-16.5) (8/8)	0
Drinking Water (pCi/L)	Gross Beta, 36	4	2.03 (1.19-2.63) (24/24)	13B Chester Water Authority	2.15 (1.33-2.63) (12/12)	1.80 (1.19-2.65) (12/12)	0

[1,5] Mean and range are based on detectable measurements only.
[2,6] Fraction of detectable measurements at specified locations is indicated in parentheses.

Attachment 2, Complete Data Table for All Analysis Results Obtained In 2024

Table 10, Monthly Drinking Water Results									
Monthly Radionuclides in Drinking Water (pCi/L)									
Location	13B			4L			6I (Control)		
Date	Gamma Emitters	Gross Beta Activity	Uncertainty (2-σ)	Gamma Emitters	Gross Beta Activity	Uncertainty (2-σ)	Gamma Emitters	Gross Beta Activity	Uncertainty (2-σ)
1/29/2024	*	1.33E+00	7.56E-01						
1/31/2024				*	1.47E+00	7.67E-01	*	1.66E+00	7.80E-01
2/26/2024	*	1.81E+00	8.05E-01						
2/28/2024				*	1.70E+00	7.96E-01	*	1.50E+00	7.83E-01
3/26/2024	*	2.06E+00	7.71E-01						
3/27/2024				*	1.19E+00	7.05E-01	*	1.42E+00	7.22E-01
4/29/2024	*	2.06E+00	7.54E-01						
5/01/2024				*	1.47E+00	7.10E-01	*	1.19E+00	6.87E-01
5/28/2024	*	2.10E+00	7.61E-01						
5/30/2024				*	1.45E+00	7.11E-01	*	1.28E+00	6.96E-01
6/24/2024	*	2.63E+00	8.42E-01						
6/27/2024				*	1.98E+00	7.96E-01	*	1.90E+00	7.90E-01
7/29/2024	*	2.42E+00	7.93E-01						
8/01/2024				*	2.42E+00	7.92E-01	*	2.56E+00	8.02E-01
8/26/2024	*	2.06E+00	7.89E-01						
8/29/2024				*	2.15E+00	7.96E-01	*	1.37E+00	7.38E-01
9/30/2024	*	2.26E+00	8.08E-01						
10/03/2024				*	2.26E+00	8.07E-01	*	1.70E+00	7.69E-01
10/28/2024	*	2.59E+00	8.33E-01						
10/31/2024				*	2.14E+00	8.01E-01	*	2.65E+00	8.35E-01
12/2/2024	*	2.46E+00	8.40E-01						
12/4/2024				*	2.26E+00	8.28E-01	*	2.20E+00	8.23E-01
12/31/2024	*	2.04E+00	7.59E-01						
01/02/2025				*	1.95E+00	7.52E-01	*	1.84E+00	7.42E-01

Table 11, Monthly Surface Water Results						
Monthly Radionuclides in Surface Water (pCi/L)						
Location	1LL (Control)			1MM		
Date	Gamma Emitters	Gross Beta Activity	Uncertainty	Gamma Emitters	Gross Beta Activity	Uncertainty
1/31/2024	*	ND	ND	*	ND	ND
2/28/2024	*	ND	ND	*	ND	ND
3/27/2024	*	ND	ND	*	ND	ND
5/1/2024	*	ND	ND	*	ND	ND
5/29/2024	*	ND	ND	*	ND	ND
6/26/2024	*	ND	ND	*	ND	ND
7/31/2024	*	ND	ND	*	ND	ND
8/28/2024	*	ND	ND	*	ND	ND
10/2/2024	*	ND	ND	*	ND	ND
10/30/2024	*	ND	ND	*	ND	ND
12/4/2024	*	ND	ND	*	ND	ND
1/1/2025	*	ND	ND	*	ND	ND
* All Non Natural Radionuclides <MDA						

Table 12, Monthly Vegetation Results			
Radionuclides in Vegetation (pCi/kg wet)			
Date	**Sample Code**	**Sample Type**	**Gamma Emitters**
6/18/2024	1C	Kale	*
6/18/2024		Horseradish	*
6/18/2024		Collards	*
7/16/2024		Kale	*
7/16/2024		Cabbage	*
7/16/2024		Collards	*
8/14/2024		Kale	*
8/14/2024		Cabbage	*
8/14/2024		Collards	*
9/10/2024		Corn Leaves	*
9/10/2024		Squash	*
9/10/2024		Collards	*
6/18/2024	2Q	Cabbage	*
6/18/2024		Broccoli	*
6/18/2024		Cauliflower	*
7/16/2024		Cabbage	*
7/16/2024		Broccoli	*
7/16/2024		Squash	*
8/14/2024		Cabbage	*
8/14/2024		Broccoli	*
8/14/2024		Squash Leaves	*
9/10/2024		Cabbage	*
9/10/2024		Broccoli	*
* All Non Natural Radionuclides <MDA			

Table 12, Monthly Vegetation Results			
Radionuclides in Vegetation (pCi/kg wet)			
Date	**Sample Code**	**Sample Type**	**Gamma Emitters**
6/18/2024	3Q	Zucchini	*
6/18/2024		Kale	*
6/18/2024		Lettuce	*
7/16/2024		Broccoli	*
7/16/2024		Kale	*
7/16/2024		Cabbage	*
8/14/2024		Cauliflower	*
8/14/2024		Cabbage	*
8/14/2024		Squash Leaves	*
9/10/2024		Cabbage	*
9/10/2024		Beets	*
9/10/2024		Sunflower Leaves	*
6/18/2024	55 (Control)	Cabbage	*
6/18/2024		Kale	*
6/18/2024		Swiss Chard	*
7/16/2024		Cabbage	*
7/16/2024		Kale	*
7/16/2024		Swiss Chard	*
8/14/2024		Cabbage	*
8/14/2024		Kale	*
8/14/2024		Swiss Chard	*
9/10/2024		Zucchini	*
9/10/2024		Corn Leaves	*
9/10/2024		Swiss Chard	*
* All Non Natural Radionuclides <MDA			

Table 13, **Monthly Milk Results**						
Monthly Gamma Emitters in Milk (pCi/L)						
Date	M-11A	M-7D	M-15B	M-4C	M-1C	M-13F (Control)
1/17/2024	*	*	*	*	*	*
2/13/2024	*	*	*	*	*	*
3/11/2024						*
3/12/2024	*	*	*	*	*	
4/3/2024	*	*	*	*	*	*
4/17/2024	*	*	*	*	*	*
4/30/2024	*	*	*	*	*	*
5/14/2024	*	*	*	*	*	*
5/29/2024	*	*	*	*	*	*
6/11/2024	*	*	*	*	*	*
6/25/2024	*	*	*	*	*	*
7/9/2024	*	*	*	*	*	*
7/23/2024	*	*	*	*	*	*
8/6/2024	*	*	*	*	*	*
8/20/2024	*	*	*	*	*	*
9/4/2024	*	*	*	*	*	*
9/17/2024	*	*	*	*	*	*
10/1/2024	*	*	*	*	*	*
10/16/2024	*	*	*	*	*	*
10/30/2024	*	*	*	*	*	*
11/12/2024	*	*	*	*	*	*
11/26/2024	*	*	*	*	*	*
12/10/2024	*	*	*	*	*	*
* All Non Natural Radionuclides <MDA						

Table 14, Weekly Airborne I-131 Results					
Concentration of Iodine-131 in Filtered Air (pCi/m^3)					
	GROUP I			GROUP II	GROUP III
Date	1B	1C	1Z	3A	5H2 (Control)
1/2/2024					*
1/4/2024	*	*	*	*	
1/8/2024					*
1/11/2024	*	*	*	*	
1/16/2024					*
1/18/2024	*	*	*	*	
1/22/2024					*
1/25/2024	*	*	*	*	
1/29/2024					*
1/31/2024	*	*	*	*	
2/6/2024					*
2/7/2024	*	*	*	*	
2/12/2024					*
2/15/2024	*	*	*	*	
2/19/2024					*
2/22/2024	*	*	*	*	
2/26/2024					*
2/28/2024	*	*	*	*	
3/4/2024					*
3/7/2024	*	*	*	*	
3/11/2024					*
3/14/2024	*	*	*	*	
3/18/2024					*
3/20/2024	*	*	*	*	

Table 14, Weekly Airborne I-131 Results					
Concentration of Iodine-131 in Filtered Air (pCi/m^3)					
	GROUP I			GROUP II	GROUP III
Date	1B	1C	1Z	3A	5H2 (Control)
3/25/2024					*
3/27/2024	*	*	*	*	
4/1/2024					*
4/4/2024	*	*	*	*	
4/8/2024					*
4/10/2024	*	*	*	*	
4/15/2024					*
4/18/2024	*	*	*	*	
4/22/2024					*
4/25/2024	*	*	*	*	
4/29/2024					*
5/1/2024	*	*	*	*	
5/6/2024					*
5/9/2024	*	*	*	*	
5/13/2024					*
5/16/2024	*	*	*	*	
5/20/2024					*
5/23/2024	*	*	*	*	
5/28/2024					*
5/30/2024	*	*	* [1]	*	
6/3/2024					*
6/6/2024	*	*	*	*	
6/10/2024					*
6/13/2024	*	*	*	*	
6/17/2024					*
6/20/2024	*	*	*	*	
6/25/2024					*
6/27/2024	*	*	*	*	

Table 14, Weekly Airborne I-131 Results					
Concentration of Iodine-131 in Filtered Air (pCi/m^3)					
	GROUP I			GROUP II	GROUP III
Date	1B	1C	1Z	3A	5H2 (Control)
7/1/2024					*
7/3/2024	*	*	*	*	
7/8/2024					*
7/11/2024	*	*	*	*	
7/15/2024					*
7/18/2024	*	*	*	*	
7/22/2024					*
7/25/2024	*	*	*	*	
7/29/2024					*
8/1/2024	*	*	*	*	
8/5/2024					*
8/8/2024	*	*	*	*	
8/12/2024					*
8/15/2024	*	*	*	*	
8/19/2024					*
8/22/2024	*	*	*	*	
8/26/2024					*
8/29/2024	*	*	*	*	
9/3/2024					*
9/5/2024	*	*	*	*	
9/9/2024					*
9/12/2024	*	*	*	*	
9/16/2024					*
9/19/2024	*	*	*	*	
9/23/2024					*
9/26/2024	*	*	*	*	
9/30/2024					*
10/3/2024	*	*	*	*	
10/7/2024					*
10/10/2024	*	*	*	*	

Table 14, Weekly Airborne I-131 Results					
Concentration of Iodine-131 in Filtered Air (pCi/m^3)					
	GROUP I			GROUP II	GROUP III
Date	1B	1C	1Z	3A	5H2 (Control)
10/14/2024					*
10/16/2024	*	*	*	*	
10/21/2024					*
10/24/2024	*	*	*	*	
10/29/2024					*
10/31/2024	*	*	*	*	
11/4/2024					*
11/7/2024	*	*	*	*	
11/11/2024					*
11/14/2024	*	*	*	*	
11/18/2024					*
11/20/2024	*	*	*	*	
11/25/2024					*
11/26/2024	*	*	*	*	
12/2/2024					*
12/4/2024	*	*	*	*	
12/9/2024					*
12/12/2024	*	*	*	*	
12/16/2024					*
12/19/2024	*	*	*	*	
12/23/2024					*
12/26/2024	*	*	*	*	
12/30/2024					*
1/02/2025	*	*	*	*	

[1] Due to air sampler failure, sample of record for this location was from collocated sample, 1A. See Table 9.

* All Non Natural Radionuclides <MDA

Table 15, Weekly Airborne Gross Beta Results										
Gross Beta Activity in Air Particulates (pCi/m^3)										
	GROUP I						GROUP II		GROUP III	
Date	1B		1C		1Z		3A		5H2 (Control)	
	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
1/2/2024									2.30E-02	2.54E-03
1/4/2024	3.12E-02	2.54E-03	3.17E-02	2.52E-03	3.12E-02	2.53E-03	3.09E-02	2.50E-03		
1/8/2024									1.97E-02	2.35E-03
1/11/2024	1.91E-02	2.25E-03	1.91E-02	2.28E-03	2.04E-02	2.29E-03	1.87E-02	2.27E-03		
1/16/2024									3.11E-02	2.31E-03
1/18/2024	4.13E-02	2.86E-03	3.08E-02	7.05E-03	4.23E-02	2.89E-03	3.74E-02	2.75E-03		
1/22/2024									3.13E-02	2.91E-03
1/25/2024	3.20E-02	2.63E-03	3.43E-02	2.54E-03	3.56E-02	2.74E-03	3.49E-02	2.72E-03		
1/29/2024									1.80E-02	2.01E-03
1/31/2024	1.00E-02	2.15E-03	1.24E-02	2.25E-03	1.34E-02	2.29E-03	1.25E-02	2.26E-03		
2/6/2024									2.18E-02	2.19E-03
2/7/2024	2.49E-02	2.28E-03	2.60E-02	2.19E-03	2.85E-02	2.40E-03	2.57E-02	2.31E-03		
2/12/2024									2.40E-02	2.61E-03
2/15/2024	3.01E-02	2.32E-03	3.32E-02	2.40E-03	3.36E-02	2.42E-03	2.87E-02	2.27E-03		
2/19/2024									2.56E-02	2.32E-03
2/22/2024	2.78E-02	2.55E-03	2.60E-02	2.49E-03	2.59E-02	2.49E-03	2.61E-02	2.50E-03		
2/26/2024									2.39E-02	2.25E-03
2/28/2024	3.24E-02	2.75E-03	3.64E-02	2.87E-03	3.29E-02	2.76E-03	3.47E-02	2.82E-03		
3/4/2024									2.41E-02	2.30E-03
3/7/2024	1.55E-02	1.81E-03	1.50E-02	1.67E-03	1.84E-02	2.04E-03	1.54E-02	1.80E-03		
3/11/2024									9.20E-03	1.62E-03
3/14/2024	2.36E-02	2.30E-03	2.45E-02	2.34E-03	2.73E-02	2.43E-03	2.61E-02	2.39E-03		
3/18/2024									3.21E-02	2.51E-03
3/20/2024	2.51E-02	2.65E-03	2.59E-02	2.78E-03	2.73E-02	2.72E-03	2.59E-02	2.76E-03		
3/25/2024									1.63E-02	2.06E-03

Table 15, Weekly Airborne Gross Beta Results										
Gross Beta Activity in Air Particulates (pCi/m^3)										
	GROUP I						GROUP II		GROUP III	
Date	1B		1C		1Z		3A		5H2 (Control)	
	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
3/27/2024	1.75E-02	2.08E-03	1.95E-02	2.16E-03	2.17E-02	2.23E-03	2.26E-02	2.26E-03		
4/1/2024									2.09E-02	2.19E-03
4/4/2024	2.01E-02	2.13E-03	2.10E-02	2.01E-03	2.26E-02	2.14E-03	2.25E-02	2.06E-03		
4/8/2024									9.62E-03	1.69E-03
4/10/2024	1.60E-02	2.42E-03	1.31E-02	2.19E-03	1.58E-02	2.23E-03	1.27E-02	2.02E-03		
4/15/2024									2.18E-02	2.16E-03
4/18/2024	2.74E-02	2.31E-03	2.89E-02	2.24E-03	3.00E-02	2.31E-03	3.10E-02	2.29E-03		
4/22/2024									1.82E-02	2.07E-03
4/25/2024	1.80E-02	2.07E-03	2.16E-02	2.19E-03	2.08E-02	2.16E-03	2.41E-02	2.28E-03		
4/29/2024									2.36E-02	2.22E-03
5/1/2024	2.97E-02	2.64E-03	3.35E-02	2.79E-03	3.07E-02	2.68E-03	3.00E-02	2.52E-03		
5/6/2024									2.09E-02	2.17E-03
5/9/2024	1.86E-02	1.95E-03	2.09E-02	2.01E-03	2.08E-02	2.02E-03	2.16E-02	2.03E-03		
5/13/2024									1.66E-02	2.03E-03
5/16/2024	1.46E-02	1.95E-03	1.66E-02	2.00E-03	1.43E-02	1.91E-03	1.74E-02	2.03E-03		
5/20/2024									1.79E-02	2.03E-03
5/23/2024	1.26E-02	1.94E-03	1.65E-02	2.12E-03	1.65E-02	2.11E-03	1.64E-02	1.98E-03		
5/28/2024									2.71E-02	2.23E-03
5/30/2024	2.57E-02	2.31E-03	2.98E-02	2.44E-03	2.52E-02 [1]	2.22E-03 [1]	2.96E-02	2.44E-03		
6/3/2024									2.35E-02	2.43E-03
6/6/2024	3.13E-02	2.70E-03	3.03E-02	2.48E-03	3.09E-02	2.52E-03	2.94E-02	2.31E-03		
6/10/2024									2.42E-02	2.34E-03
6/13/2024	1.58E-02	1.97E-03	1.83E-02	2.07E-03	1.41E-02	1.91E-03	1.74E-02	2.04E-03		
6/17/2024									2.15E-02	2.53E-03
6/20/2024	2.52E-02	2.30E-03	2.99E-02	2.46E-03	2.80E-02	2.39E-03	2.90E-02	2.29E-03		
6/25/2024									2.98E-02	2.33E-03
6/27/2024	2.74E-02	2.54E-03	3.25E-02	2.52E-03	3.41E-02	2.66E-03	3.42E-02	2.57E-03		

Table 15, Weekly Airborne Gross Beta Results										
Gross Beta Activity in Air Particulates (pCi/m³)										
	GROUP I						GROUP II		GROUP III	
Date	1B		1C		1Z		3A		5H2 (Control)	
	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
7/1/2024									2.07E-02	2.47E-03
7/3/2024	1.47E-02	2.27E-03	1.50E-02	2.28E-03	1.68E-02	2.35E-03	1.71E-02	2.37E-03		
7/8/2024									2.50E-02	2.34E-03
7/11/2024	3.29E-02	2.50E-03	3.39E-02	2.38E-03	3.65E-02	2.61E-03	3.49E-02	2.40E-03		
7/15/2024									2.61E-02	2.34E-03
7/18/2024	3.00E-02	2.65E-03	2.92E-02	2.47E-03	3.05E-02	2.50E-03	3.14E-02	2.40E-03		
7/22/2024									3.06E-02	2.74E-03
7/25/2024	3.04E-02	2.51E-03	3.04E-02	2.49E-03	2.75E-02	2.41E-03	3.11E-02	2.36E-03		
7/29/2024									2.57E-02	2.37E-03
8/1/2024	3.40E-02	2.63E-03	3.10E-02	2.54E-03	2.78E-02	2.44E-03	3.59E-02	2.68E-03		
8/5/2024									3.35E-02	2.61E-03
8/8/2024	3.17E-02	2.55E-03	3.36E-02	2.61E-03	3.11E-02	2.53E-03	3.29E-02	2.59E-03		
8/12/2024									2.49E-02	2.32E-03
8/15/2024	2.48E-02	2.34E-03	2.29E-02	2.28E-03	2.76E-02	2.60E-03	2.52E-02	2.38E-03		
8/19/2024									2.88E-02	2.49E-03
8/22/2024	2.48E-02	2.36E-03	2.42E-02	2.35E-03	2.58E-02	2.40E-03	2.42E-02	2.33E-03		
8/26/2024									2.42E-02	2.35E-03
8/29/2024	5.33E-02	3.10E-03	4.90E-02	3.01E-03	5.71E-02	3.20E-03	5.99E-02	3.29E-03		
9/3/2024									3.65E-02	2.49E-03
9/5/2024	3.17E-02	2.63E-03	3.16E-02	2.61E-03	4.02E-02	2.86E-03	5.28E-02	3.16E-03		
9/9/2024									1.85E-02	2.45E-03
9/12/2024	3.14E-02	2.58E-03	3.04E-02	2.54E-03	3.17E-02	2.58E-03	3.23E-02	2.61E-03		
9/16/2024									4.15E-02	2.81E-03
9/19/2024	3.79E-02	2.75E-03	3.65E-02	2.71E-03	4.22E-02	2.86E-03	4.08E-02	2.82E-03		
9/23/2024									3.54E-02	2.66E-03
9/26/2024	3.20E-02	2.53E-03	2.64E-02	2.35E-03	3.14E-02	2.51E-03	3.14E-02	2.51E-03		
9/30/2024									1.02E-02	1.81E-03
10/3/2024	1.22E-02	1.89E-03	1.32E-02	1.94E-03	1.27E-02	1.91E-03	1.03E-02	1.82E-03		
10/7/2024									2.51E-02	2.32E-03

Table 15, Weekly Airborne Gross Beta Results										
Gross Beta Activity in Air Particulates (pCi/m^3)										
	GROUP I						GROUP II		GROUP III	
Date	1B		1C		1Z		3A		5H2 (Control)	
	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
10/10/2024	3.75E-02	2.69E-03	3.44E-02	2.59E-03	4.26E-02	2.82E-03	4.16E-02	2.80E-03		
10/14/2024									3.30E-02	2.51E-03
10/16/2024	4.01E-02	2.97E-03	3.87E-02	2.97E-03	3.35E-02	2.63E-03	3.64E-02	2.89E-03		
10/21/2024									2.31E-02	2.26E-03
10/24/2024	4.75E-02	2.77E-03	4.26E-02	2.62E-03	4.28E-02	2.50E-03	4.46E-02	2.68E-03		
10/29/2024									3.92E-02	2.55E-03
10/31/2024	4.25E-02	2.85E-03	3.54E-02	2.65E-03	3.55E-02	2.50E-03	3.77E-02	2.72E-03		
11/4/2024									3.10E-02	2.73E-03
11/7/2024	2.66E-02	2.20E-03	2.99E-02	2.45E-03	3.33E-02	2.41E-03	2.64E-02	2.33E-03		
11/11/2024									2.48E-02	2.33E-03
11/14/2024	2.63E-02	2.40E-03	2.59E-02	2.37E-03	2.98E-02	2.49E-03	2.66E-02	2.40E-03		
11/18/2024									2.18E-02	2.27E-03
11/20/2024	3.59E-02	2.92E-03	3.19E-02	2.82E-03	3.67E-02	2.96E-03	3.36E-02	2.86E-03		
11/25/2024									3.21E-02	2.45E-03
11/26/2024	2.39E-02	2.50E-03	2.48E-02	2.51E-03	2.37E-02	2.47E-03	2.50E-02	2.52E-03		
12/2/2024									3.38E-02	2.65E-03
12/4/2024	3.61E-02	2.44E-03	3.64E-02	2.46E-03	3.52E-02	2.42E-03	3.65E-02	2.46E-03		
12/9/2024									2.92E-02	2.47E-03
12/12/2024	3.82E-02	2.56E-03	3.74E-02	2.55E-03	3.97E-02	2.61E-03	3.43E-02	2.46E-03		
12/16/2024									3.08E-02	2.47E-03
12/19/2024	2.58E-02	2.33E-03	2.74E-02	2.37E-03	2.61E-02	2.32E-03	2.56E-02	2.31E-03		
12/23/2024									1.67E-02	2.05E-03
12/26/2024	2.92E-02	2.44E-03	3.26E-02	2.56E-03	3.07E-02	2.50E-03	2.87E-02	2.44E-03		
12/30/2024									2.30E-02	2.24E-03
1/02/2025	1.97E-02	2.12E-03	2.42E-02	2.27E-03	2.40E-02	2.26E-03	2.21E-02	2.19E-03		

[1] Due to air sampler failure, sample of record for this location was from collocated sample, 1A. See Table 9.

Table 16, Quarterly Isotopic Data for Air Filters, Water, Milk and Fish

Location	Nuclide	Q1	Q2	Q3	Q4
Quarterly Air Filter Composite for Gamma Emitters (pCi/m^3)					
5H2 (Control)	Cs134, Cs137	<MDAs	<MDAs	<MDAs	<MDAs
3A	Cs134, Cs137	<MDAs	<MDAs	<MDAs	<MDAs
1Z	Cs134, Cs137	<MDAs	<MDAs	<MDAs	<MDAs
1B	Cs134, Cs137	<MDAs	<MDAs	<MDAs	<MDAs
1C	Cs134, Cs137	<MDAs	<MDAs	<MDAs	<MDAs
Quarterly Tritium in Water (pCi/L)					
1LL	H-3	<MDA	<MDA	<MDA	<MDA
1MM	H-3	<MDA	<MDA	<MDA	<MDA
6I	H-3	<MDA	<MDA	<MDA	<MDA
4L	H-3	<MDA	<MDA	<MDA	<MDA
13B	H-3	<MDA	<MDA	<MDA	<MDA
Quarterly Milk Samples for Gamma Emitters (pCi/m^3)					
M-3D	Gamma Emitters	<MDAs	<MDAs	<MDAs	<MDAs
M-1F	Gamma Emitters	<MDAs	<MDAs	<MDAs	<MDAs
M-3B	Gamma Emitters	<MDAs	<MDAs	<MDAs	<MDAs
M-9G	Gamma Emitters	<MDAs	<MDAs	<MDAs	<MDAs
M-15G	Gamma Emitters	<MDAs	<MDAs	<MDAs	<MDAs

Table 17, Gamma Isotopic Results for Fish			
Radionuclides in Fish (pCi/kg wet)			
Sample Date	Sample Code	Sample Type	Gamma Emitters
6/6/2024	4	Bottom Feeder	*
6/6/2024		Predator Fish	*
10/8/2024		Bottom Feeder	*
10/8/2024		Predator Fish	*
6/7/2024	6	Bottom Feeder	*
6/7/2024		Predator Fish	*
10/21/2024		Predator Fish	*
10/21/2024		Bottom Feeder	*
*All Non-Natural Gamma Emitters <MDA			

Table 18, Gamma Isotopic Results for Sediment		
Radionuclides in Sediment (pCi/kg dry)		
Sample Date	Sample Code	Gamma Emitters
5/22/2024	4J	*
11/5/2024	4J	*
5/22/2024	4T	*
11/5/2024	4T	*
5/22/2024	6F	*
11/5/2024	6F	*
*All Non-Natural Gamma Emitters <MDA		

Attachment 3, Cross Check Intercomparison Program

Participation in cross check intercomparison studies is mandatory for laboratories performing analyses of REMP samples satisfying the requirements in the Offsite Site Dose Calculation Manual. Intercomparison studies provide a consistent and effective means to evaluate the accuracy and precision of analyses performed by a laboratory. Study results should fall within specified control limits and results that fall outside the control limits are investigated and corrected.

Constellation Generation Solutions Laboratory participated in the following proficiency testing studies provided by Environmental Resource Associates (ERA) and Eckert Ziegler Analytics (EZA) in 2024. The Laboratory's intercomparison program results for 2024 are summarized below.

Attachment 3 is a summary of Constellation Generation Solutions (CGS) laboratory's quality assurance program. It consists of Table 19 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 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.

The CGS laboratory's intercomparison results are in full agreement when they were evaluated using designated acceptance ranges and the Resolution Test Criteria in accordance with the Constellation Radiochemistry Quality Control procedure, except as noted in the Pass/Fail column and described below. The CGS laboratory's results are provided with their analytical uncertainties of 2 sigma. When evaluating with the Resolution Test a one sigma uncertainty is used to determine Pass or Fail and noted accordingly. Co-located air samplers provide the opportunity to perform interlaboratory comparisons of beta particulate and radioiodine filters that due to the nature of the sample precludes them from splitting for analysis. Results of 1Z analyzed by CGS and 1A analyzed by TBE for beta particulates are provided at the end of this table for review and are generally in good agreement. The radioiodine samples collected alongside the beta particulate filters were analyzed and all were below MDA so there are no results to compare for that parameter.

All CGS results reported passed their respective acceptance ranges and Resolution Test Criteria with the following two exceptions for the interlaboratory crosschecks:

RAD-137 I-131 water study on 04/08/2024 on Detector 6 (D6) failed high at 29.7 pCi/L for a true value of 25.1 pCi/L with an acceptance range of 21.7 – 28.5 pCi/L. This was a new detector, and the study had very low area counts. Of the three runs, the other two values would have passed. Results on all other detectors were successful. Further review of the data indicated all the Ba-133 results in the other RAD-137 water study were in acceptable range. In that study, Ba-133 is meant to approximate I-131 results as it has an energy very close to I-131 in the spectrum. The detector is new in the lab and there is an ongoing review of its performance to identify the optimal operating range and any inherent bias.

E14044 Filter study on 12/05/24 failed low for Cs-134 on D6 reporting 91.3 +/- 3.25 pCi for a true value of 116 pCi. This study also had unusually low area counts in this range of the spectrum. The result did pass the acceptance range of 81.2 – 150.8 pCi, however due to the extremely low activity level, count times were extended significantly to capture other isotopes with lower yields resulting in very low uncertainties for higher yield isotopes. In the case of Cs-134 the uncertainty was less than 5% and at the level of recovery observed, the result failed the resolution test. Routine analysis is normally performed to achieve 15% +/- 5 %. Review of all other studies performed on this detector showed successful performance for Cs-134 and all other isotopes. The evaluation of detector performance is ongoing to identify inherent bias or variability at low count rates as is observed in environmental samples.

The vendor laboratories used by CGS for subcontracting and interlaboratory comparison samples, GEL Laboratories and Teledyne Brown Engineering (TBE), 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, [52,53]. In summary GEL and TBE reported results met vendor and laboratory acceptance ranges with the following exceptions described here.

For TBE, the following three studies reported data that did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. Investigations of the failures are described as follows:

TBE Crosschecks failed high for MRAD-40 Gross Beta at 42.1 pCi/Filter. The true value was 22.2 and the acceptable range was 13.5-33.5 pCi/Filter. All QC associated with the original sample was acceptable and no anomalies were found. This sample was used as the WG duplicate with a result of 42.5 pCi. Both were counted on the same detector. Upon comparison to historical sample data, the alpha activity of this ERA submitted sample was the highest assigned result, and the beta activity was the lowest. Therefore, the alpha-to-beta crosstalk was more significant than normal, causing the beta activity to report falsely high data. The counting room laboratory staff will adjust the alpha-to-beta crosstalk via correction calculation measures when high alpha are observed. Subsequent study MRAD-41 for Gross Beta filter returned acceptable results.

RAD-137 Gross Alpha in water failed low at 35.2 pCi/L. The true value was 52.6 pCi/L and the acceptable range was 39.6 – 65.6 pCi/L. A QuiKResponse repeat study was analyzed and failed high at 40.3 pCi/L and the acceptable range was 21.5 – 38.5 pCi/L. Investigation showed higher than usual solids in the ERA study, out of the usual range of client samples received by the lab. Also, a different attenuation curve, Th-230, was used for the crosscheck than had been used historically. This curve was less representative of client samples. The lab review of data also showed that a replicate run of the sample would have passed but the lab chose the wrong replicate to report. The lab has gone to a lower volume of sample and resumed using the Am-241 attenuation curve which more closely mirrors client samples and subsequent crosschecks are reporting acceptable.

Quarter 1-2024 gamma results for Co-60 (air filter) and Ce-141 (soil) both failed high. The reported result for the filter Co-60 was 168+/- 12.7 and the known value was 126+/-2.1; the reported results for the soil Ce-141 was 0.106 and the known value was 0.0714+/-0.0013 pCi/g. The root cause investigation showed successful results for the filter on another detector. All QC associated with this sample was acceptable. The soil was recounted on another detector and Ce-141 result of 0.085 was acceptable and generally the same for other geometries. All QC associated with this sample was acceptable. No effective corrective action can be taken at this time. Historically, the Filter Co-60 and soil Ce-141 results have been well within TBE QC acceptance ranges. TBE has successfully passed cross-check results, and it appears that these two results are anomalous. If there is a recurrence, a root cause investigation will be done promptly.

For the GEL Laboratory, the following six studies reported data that did not meet the specified acceptance criteria and were addressed through GEL's internal nonconformance system. A summary is found below:

RAD-136 water Sr-90 failed high, while I-131 failed low.
Strontium-90: The Group Leader has reviewed the method to identify the bias. The method LCS trend was reviewed, and no anomalies were identified. The calibration used for the analysis was compared to the new calibration performed recently and the original reported data was processed with both calibrations for comparison. Data still maintained a high bias but was within the limits of the study. A sample of known Strontium concentration was analyzed, and the results were processed using the new calibration. The result was within the mid-range of the acceptance limits. Instrument run logs were reviewed and there was no indication of possible bias from a previously counted sample.

Iodine-131: The laboratory has reviewed the data and found no errors. All batch QC samples, including a duplicate, met acceptance criteria. The carrier yields were found to be slightly higher than typically seen in this method, possibly contributing to the low bias in the result. The laboratory will continue to investigate all steps of the analytical process.

RAD-137 water Sr-90 and I-131 studies both failed low.
Strontium-90: The unacceptable result was analyzed by a modified method of 905.0 and recovered 83% of the known value which is acceptable for the laboratory's LCS. The PT sample was also analyzed by EPA DW method 905.0 and achieved an acceptable result recovering 94% of the assigned value. The RPD between the methods was 12%. The laboratory is evaluating calibration, yield determination, techniques, reagents, carriers, and each step of the process for areas of improvement.

Iodine-131: The laboratory has reviewed the data and no errors were noted. All batch QC samples, including an in-batch duplicate, met acceptance criteria. It was noted that the carrier yields were found to be slightly higher than are typically seen in this method including the reference sample used to calculate the LCS, potentially contributing to the low bias in the result.

RAD-138 Sr-90 and I-131 on water failed low.
Strontium-90: The laboratory conducted an in-depth review of all available data and did not identify any specific errors or anomalies that could explain the performance evaluation failure. The instrument calibrations were reviewed for possible significant areas of variance when compared to previous calibrations and none were noted. The quality department conducted direct observations of the analytical processes noting minor areas of improvement during precipitations and column separations. A definitive root cause was not isolated during the investigation.

Iodine-131: The laboratory has reviewed the data and found no errors. All batch QC samples, including an in-batch duplicate, met the acceptance criteria. As part of the investigation, the quality department observed the preparation process. During the review, it was identified that a reagent may have been improperly diluted, potentially contributing to the low bias observed in the results. This procedural discrepancy has been noted as a probable cause requiring corrective action.

The laboratory has since successfully completed a single-blind spiked sample, achieving results within the acceptance criteria for both Sr-90 and I-131.

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
3/14/2024	E14036 Milk	pCi/L	I-131	96.7	90.8	63.6	118	Pass
		pCi/L	Cs-134	182	198	139	257	Pass
		pCi/L	Cs-137	181	171	120	222	Pass
		pCi/L	Ce-141	88.1	85	59.5	111	Pass
		pCi/L	Cr-51	281	230	161	299	Pass
		pCi/L	Mn-54	187	183	128	238	Pass
		pCi/L	Fe-59	93.6	86.5	60.6	112	Pass
		pCi/L	Co-60	152	158	111	205	Pass
		pCi/L	Zn-65	161	176	123	229	Pass
3/14/2024	E14037 Water	pCi/L	Beta Cs-137	238	231	162	300	Pass
3/14/2024	E14038 Charcoal	pCi	I-131	75.9	90.2	63.1	117	Pass
3/14/2024	E14038 Charcoal	pCi	I-131	79.0	90.2	63.1	117	Pass
3/14/2024	E14038 Charcoal	pCi	I-131	77.1	90.2	63.1	117	Pass
3/14/2024	E14038 Charcoal	pCi	I-131	77.3	90.2	63.1	117	Pass
4/8/2024	RAD-137 Water	pCi/L	I-131	27.1	25.1	21.7	28.5	Pass
4/8/2024	RAD-137 Water	pCi/L	I-131	25.1	25.1	21.7	28.5	Pass
4/8/2024	RAD-137 Water	pCi/L	I-131	27.5	25.1	21.7	28.5	Pass
4/8/2024	RAD-137 Water	pCi/L	I-131	29.7	25.1	21.7	28.5	Fail [1]
4/8/2024	RAD-137 Water	pCi/L	Beta Cs-137	36.6	46.5	33.9	59.1	Pass
4/8/2024	RAD-137 Water	pCi/L	Cs-134	55.9	57.8	42.8	72.8	Pass
		pCi/L	Cs-137	190	186	149	223	Pass
		pCi/L	Co-60	98.8	98.8	79.7	118	Pass
		pCi/L	Zn-65	228	240	188	292	Pass
4/8/2024	RAD-137 Water	pCi/L	Cs-134	60.7	57.8	42.8	72.8	Pass
		pCi/L	Cs-137	185	186	149	223	Pass
		pCi/L	Co-60	97.7	98.8	79.7	118	Pass
		pCi/L	Zn-65	233	240	188	292	Pass

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance Lower Limit	Acceptance Upper Limit	Performance Evaluation
4/8/2024	RAD-137 Water	pCi/L	Cs-134	59.8	57.8	42.8	72.8	Pass
		pCi/L	Cs-137	190	186	149	223	Pass
		pCi/L	Co-60	97.2	98.8	79.7	118	Pass
		pCi/L	Zn-65	240	240	188	292	Pass
4/8/2024	RAD-137 Water	pCi/L	Cs-134	58.6	57.8	42.8	72.8	Pass
		pCi/L	Cs-137	185	186	149	223	Pass
		pCi/L	Co-60	102	98.8	79.7	118	Pass
		pCi/L	Zn-65	227	240	188	292	Pass
6/13/2024	E14101 Soil	pCi/g	Cs-134	0.406	0.408	0.286	0.530	Pass
		pCi/g	Cs-137	0.402	0.451	0.316	0.586	Pass
6/13/2024	E14101 Soil	pCi/g	Cs-134	0.372	0.408	0.286	0.530	Pass
6/13/2024	E14101 Soil	pCi/g	Cs-137	0.365	0.451	0.316	0.586	Pass
6/13/2024	E14039 Water	pCi/L	Beta Cs-137	265	262	183	341	Pass
6/13/2024	E14040 Water	pCi/L	Ce-141	45.4	37.5	26.3	48.8	Pass
		pCi/L	Co-60	402	391	274	508	Pass
		pCi/L	Cr-51	250	291	204	378	Pass
		pCi/L	Cs-134	237	242	169	315	Pass
		pCi/L	Cs-137	233	229	160	298	Pass
		pCi/L	Fe-59	183	174	122	226	Pass
		pCi/L	Mn-54	209	204	143	265	Pass
		pCi/L	Zn-65	89.6	99.1	69.4	129	Pass
6/13/2024	E14040 Water	pCi/L	Ce-141	40	37.5	26.3	48.8	Pass
		pCi/L	Co-60	397	391	274	508	Pass
		pCi/L	Cr-51	286	291	204	378	Pass
		pCi/L	Cs-134	238	242	169	315	Pass
		pCi/L	Cs-137	237	229	160	298	Pass
		pCi/L	Fe-59	183	174	122	226	Pass
		pCi/L	Mn-54	212	204	143	265	Pass
		pCi/L	Zn-65	95.4	99.1	69.4	129	Pass

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance Lower Limit	Acceptance Upper Limit	Performance Evaluation
6/13/2024	E14041 Filter	pCi	Ce-141	25.4	25.2	17.6	32.8	Pass
		pCi	Co-60	258	262	183	341	Pass
6/13/2024	E14041 Filter	pCi	Cr-51	211	195	137	254	Pass
		pCi	Cs-134	137	162	113	211	Pass
		pCi	Cs-137	159	153	107	199	Pass
		pCi	Fe-59	132	117	81.9	152	Pass
		pCi	Mn-54	143	137	95.9	178	Pass
		pCi	Zn-65	71.0	66.4	46.5	86.3	Pass
6/13/2024	E14042A Filter	pCi	Beta Cs-137	249	220	154	286	Pass
9/12/2024	E14043 Filter	pCi	Beta Cs-137	242	221	84.7	157	Pass
9/12/2024	E14102 Soil	pCi/g	Cs-134	0.318	0.336	0.235	0.437	Pass
		pCi/g	Cs-137	0.287	0.295	0.207	0.384	Pass
9/12/2024	E14102 Soil	pCi/g	Cs-134	0.299	0.336	0.235	0.437	Pass
		pCi/g	Cs-137	0.269	0.295	0.207	0.384	Pass
9/12/2024	E14102 Soil	pCi/g	Cs-134	0.305	0.336	0.235	0.437	Pass
		pCi/g	Cs-137	0.277	0.295	0.207	0.384	Pass
9/12/2024	E14102 Soil	pCi/g	Cs-134	0.312	0.336	0.235	0.437	Pass
		pCi/g	Cs-137	0.282	0.295	0.207	0.384	Pass
9/16/2024	MRAD-41 Filter	pCi	Cs-134	499	581	377	712	Pass
9/16/2024	MRAD-41 Filter	pCi	Cs-137	880	848	696	1110	Pass
		pCi	Co-60	865	839	713	1070	Pass
		pCi	Zn-65	269	239	196	365	Pass
10/4/2024	RAD-139 Water	pCi/L	Cs-134	79.6	80.2	63.0	97.4	Pass
		pCi/L	Cs-137	49.7	46.3	23.3	69.3	Pass
10/4/2024	RAD-139 Water	pCi/L	Co-60	47.9	45.3	31.6	59.0	Pass
		pCi/L	Zn-65	108	114	75.0	153	Pass

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance Lower Limit	Acceptance Upper Limit	Performance Evaluation
10/4/2024	RAD-139 Water	pCi/L	Cs-134	79.8	80.2	63.0	97.4	Pass
		pCi/L	Cs-137	46.0	46.3	23.3	69.3	Pass
		pCi/L	Co-60	49.4	45.3	31.6	59.0	Pass
		pCi/L	Zn-65	106	114	75.0	153	Pass
10/4/2024	RAD-139 Water	pCi/L	Cs-134	79.4	80.2	63.0	97.4	Pass
		pCi/L	Cs-137	46.3	46.3	23.3	69.3	Pass
		pCi/L	Co-60	47.5	45.3	31.6	59.0	Pass
		pCi/L	Zn-65	106	114	75.0	153	Pass
10/4/2024	RAD-139 Water	pCi/L	I-131	26.4	26.3	22.7	29.9	Pass
10/4/2024	RAD-139 Water	pCi/L	I-131	26.3	26.3	22.7	29.9	Pass
12/5/2024	E14044 Filter	pCi	Ce-141	75.7	74.8	52	97	Pass
		pCi	Co-58	105	97.9	69	127	Pass
		pCi	Cr-60	220	219	153	285	Pass
		pCi	Cr-51	182	185	130	241	Pass
		pCi	Cs-134	97.9	116	81	151	Pass
		pCi	Cs-137	144	144	101	187	Pass
		pCi	Fe-59	130	107	75	139	Pass
		pCi	Mn-54	113	104	73	135	Pass
		pCi	Zn-65	164	155	109	202	Pass
12/5/2024	E14044 Filter	pCi	Ce-141	69.3	74.8	52	97	Pass
		pCi	Co-58	93.7	97.9	69	127	Pass
		pCi	Cr-60	196	219	153	285	Pass
		pCi	Cr-51	166	185	130	241	Pass
		pCi	Cs-134	91.3	116	81	151	Fail [1]
		pCi	Cs-137	135	144	101	187	Pass
		pCi	Fe-59	113	107	75	139	Pass
		pCi	Mn-54	106	104	73	135	Pass
		pCi	Zn-65	146	155	109	202	Pass

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
12/5/2024	E14044 Filter	pCi	Ce-141	66.6	74.8	52	97	Pass
		pCi	Co-58	92.4	97.9	69	127	Pass
		pCi	Cr-60	204	219	153	285	Pass
		pCi	Cr-51	175	185	130	241	Pass
		pCi	Cs-134	95.7	116	81	151	Pass
12/5/2024	E14044 Filter	pCi	Cs-137	139	144	101	187	Pass
		pCi	Fe-59	119	107	75	139	Pass
		pCi	Mn-54	102	104	73	135	Pass
		pCi	Zn-65	139	155	109	202	Pass
12/5/2024	E14045 Water	pCi/L	Beta Cs-137	257	240	168	312	Pass
12/5/2024	E14046 Charcoal	pCi	I-131	58.0	65.3	45.7	84.9	Pass
		pCi	I-131	59.3	65.3	45.7	84.9	Pass
		pCi	I-131	59.4	65.3	45.7	84.9	Pass
12/5/2024	E14047 Milk	pCi/L	Ce-141	74.7	71.6	50.1	93.1	Pass
		pCi/L	Co-58	95.2	93.7	65.6	122	Pass
		pCi/L	Co-60	211	210	147	273	Pass
		pCi/L	Cr-51	164	177	124	230	Pass
		pCi/L	Cs-134	114	111	77.7	144	Pass
		pCi/L	Cs-137	150	138	96.6	179	Pass
		pCi/L	Fe-59	112	102	71.4	133	Pass
		pCi/L	I-131	50.1	51.0	35.7	66.3	Pass
		pCi/L	Mn-54	106	99.5	69.7	129	Pass
		pCi/L	Zn-65	141	149	104	194	Pass
12/5/2024	E14047 Milk	pCi/L	Ce-141	77.8	71.6	50.1	93.1	Pass
		pCi/L	Co-58	96.9	93.7	65.6	122	Pass
12/5/2024	E14047 Milk	pCi/L	Co-60	208	210	147	273	Pass
		pCi/L	Cr-51	205	177	124	230	Pass
		pCi/L	Cs-134	110	111	77.7	144	Pass
		pCi/L	Cs-137	140	138	96.6	179	Pass
		pCi/L	Fe-59	100	102	71.4	133	Pass
		pCi/L	I-131	45.5	51.0	35.7	66.3	Pass

Table 19, CGS Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance Lower Limit	Acceptance Upper Limit	Performance Evaluation
		pCi/L	Mn-54	109	99.5	69.7	129	Pass
		pCi/L	Zn-65	136	149	104	194	Pass
12/5/2024	E14047 Milk	pCi/L	Ce-141	71.9	71.6	50.1	93.1	Pass
		pCi/L	Co-58	89.7	93.7	65.6	122	Pass
		pCi/L	Co-60	232	210	147	273	Pass
		pCi/L	Cr-51	180	177	124	230	Pass
		pCi/L	Cs-134	113	111	77.7	144	Pass
		pCi/L	Cs-137	149	138	96.6	179	Pass
		pCi/L	Fe-59	112	102	71.4	133	Pass
		pCi/L	I-131	63.3	51.0	35.7	66.3	Pass
		pCi/L	Mn-54	105	99.5	69.7	129	Pass
		pCi/L	Zn-65	148	149	104	194	Pass

[1] See Discussion at the beginning of Attachment 3

Table 20, Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Water	4L	1/31/2024	Gross Beta	pCi/L	1.47	0.77	<MDA	Pass
Water	4L	1/31/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	1/31/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	2/28/2024	Gross Beta	pCi/L	1.70	0.80	2.15±1.33	Pass
Water	4L	2/28/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	2/28/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	3/27/2024	Gross Beta	pCi/L	1.19	0.71	<MDA	Pass
Water	4L	3/27/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	3/27/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	3/27/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	4L	5/1/2024	Gross Beta	pCi/L	1.47	0.71	<MDA	Pass
Water	4L	5/1/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	5/1/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	5/30/2024	Gross Beta	pCi/L	1.45	0.71	2.66±1.45	Pass
Water	4L	5/30/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	5/30/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	6/27/2024	Gross Beta	pCi/L	1.98	0.80	3.32±1.40	Pass
Water	4L	6/27/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	6/27/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	6/27/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	4L	8/1/2024	Gross Beta	pCi/L	2.42	0.79	3.98±1.63	Pass
Water	4L	8/1/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	8/1/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	8/29/2024	Gross Beta	pCi/L	2.15	0.80	<MDA	Pass
Water	4L	8/29/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	8/29/2024	Gamma	pCi/L	<MDA		<MDA	Pass

Table 20, Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Water	4L	10/3/2024	Gross Beta	pCi/L	2.26	0.81	1.97±1.34	Pass
Water	4L	10/3/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	10/3/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	10/3/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	4L	10/31/2024	Gross Beta	pCi/L	2.14	0.80	<MDA	Pass
Water	4L	10/31/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	10/31/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	12/4/2024	Gross Beta	pCi/L	2.26	0.83	2.61±1.67	Pass
Water	4L	12/4/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	12/4/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	1/2/2025	Gross Beta	pCi/L	1.95	0.75	2.13±1.31	Pass
Water	4L	1/2/2025	LLI	pCi/L	<MDA		<MDA	Pass
Water	4L	1/2/2025	Gamma	pCi/L	<MDA		<MDA	Pass
Water	4L	1/2/2025	Tritium	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	2/13/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	2/13/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	2/13/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	2/13/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	2/13/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	2/13/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	5/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	5/14/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	5/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	5/14/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	5/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass

Table 20, Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Milk	M-7D	5/14/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	8/6/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	8/6/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	8/6/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	8/6/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	8/6/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	8/6/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	11/12/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-11A	11/12/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	11/12/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	11/12/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	11/12/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	11/12/2024	LLI	pCi/L	<MDA		<MDA	Pass
Filter Composite	1Z/1A	3/27/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	1Z/1A	6/27/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	1Z/1A	10/3/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	1Z/1A	1/2/2025	Gamma	pCi/m^3	<MDA		<MDA	Pass
Milk	M-13F	5/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-13F	5/14/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	5/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	M-7D	5/14/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 20, Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Vegetation	H1-2	6/19/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	H1-2	7/17/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	H1-2	8/14/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	H1-2	9/11/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	B10-2	8/14/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	B10-2	8/14/2024	Strontium 90	pCi/Kg	<MDA		<MDA	Pass
Fish	INDP	10/16/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Fish	INDP	10/16/2024	Strontium 90	pCi/Kg	<MDA		<MDA	Pass
Sediment	J2-1	10/29/24	Gamma	pCi/Kg	<MDA		<MDA	Pass
Water	WA1	6/28/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	WA2	6/28/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Oysters	IA3	6/19/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Oysters	IA6	6/19/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Bottom Sediment	WBS4	6/19/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Bottom Sediment	WBS2	6/19/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	IB10	7/22/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	IB11	7/22/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	IB12	7/22/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Vegetation	East	7/23/2024	Gamma	pCi/Kg	<MDA		<MDA	Pass
Milk	Farm A	09/03/2024	Gamma	Gamma	pCi/L		<MDA	Pass
Milk	Farm A	09/03/2024	Gamma	LLI	pCi/L		<MDA	Pass

Table 20, Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Milk	Farm B	09/03/2024	Gamma	Gamma	pCi/L		<MDA	Pass
Milk	Farm B	09/03/2024	Gamma	LLI	pCi/L		<MDA	Pass
Milk	#55	09/09/2024	Gamma	Gamma	pCi/L		<MDA	Pass
Milk	#55	09/09/2024	Gamma	LLI	pCi/L		<MDA	Pass
Fish (Spanish Mackerel)	IA1	8/14/2024	Gamma	pCi/kg	<MDA		<MDA	Pass
Filter Composite	CC-A1	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-A2	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-A3	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-A4	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-A5	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-SFA1	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-SFA2	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-SFA3	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass
Filter Composite	CC-SFA4	9/30/2024	Gamma	pCi/m^3	<MDA		<MDA	Pass

Table 21, Comparison of Gross Beta Results from Split Samples of 1Z and 1A

Interlaboratory Split Sample Results (Air Particulate Beta)

Media	Location	Sample Date	Beta	pCi/M3	(CGS) 1Z	(CGS) ±2σ	(TBE) 1A	(TBE) ±2σ
Filter	1Z / 1A	1/4/2024	Beta	pCi/M3	3.12E-02	2.53E-03	1.74E-02	4.10E-03
Filter	1Z / 1A	1/11/2024	Beta	pCi/M3	2.04E-02	2.29E-03	9.27E-03	3.80E-03
Filter	1Z / 1A	1/18/2024	Beta	pCi/M3	4.23E-02	2.89E-03	2.19E-02	4.58E-03
Filter	1Z / 1A	1/25/2024	Beta	pCi/M3	3.56E-02	2.74E-03	2.10E-02	4.55E-03
Filter	1Z / 1A	1/31/2024	Beta	pCi/M3	1.34E-02	2.29E-03	1.08E-02	3.97E-03
Filter	1Z / 1A	2/7/2024	Beta	pCi/M3	2.85E-02	2.40E-03	1.39E-02	4.06E-03
Filter	1Z / 1A	2/15/2024	Beta	pCi/M3	3.36E-02	2.42E-03	1.87E-02	4.15E-03
Filter	1Z / 1A	2/22/2024	Beta	pCi/M3	2.59E-02	2.49E-03	1.71E-02	4.03E-03
Filter	1Z / 1A	2/28/2024	Beta	pCi/M3	3.29E-02	2.76E-03	1.86E-02	4.92E-03
Filter	1Z / 1A	3/7/2024	Beta	pCi/M3	1.84E-02	2.04E-03	9.35E-03	3.25E-03
Filter	1Z / 1A	3/14/2024	Beta	pCi/M3	2.73E-02	2.43E-03	2.06E-02	4.25E-03
Filter	1Z / 1A	3/20/2024	Beta	pCi/M3	2.73E-02	2.72E-03	1.13E-02	4.46E-03
Filter	1Z / 1A	3/27/2024	Beta	pCi/M3	2.17E-02	2.23E-03	1.15E-02	3.84E-03
Filter	1Z / 1A	4/4/2024	Beta	pCi/M3	2.26E-02	2.14E-03	1.63E-02	4.28E-03
Filter	1Z / 1A	4/10/2024	Beta	pCi/M3	1.58E-02	2.23E-03	1.13E-02	3.45E-03
Filter	1Z / 1A	4/18/2024	Beta	pCi/M3	3.00E-02	2.31E-03	1.95E-02	4.23E-03
Filter	1Z / 1A	4/25/2024	Beta	pCi/M3	2.08E-02	2.16E-03	1.33E-02	3.69E-03
Filter	1Z / 1A	5/1/2024	Beta	pCi/M3	3.07E-02	2.68E-03	2.27E-02	4.71E-03
Filter	1Z / 1A	5/9/2024	Beta	pCi/M3	2.08E-02	2.02E-03	1.43E-02	3.69E-03
Filter	1Z / 1A	5/16/2024	Beta	pCi/M3	1.43E-02	1.91E-03	9.14E-03	3.72E-03
Filter	1Z / 1A	5/23/2024	Beta	pCi/M3	1.65E-02	2.11E-03	1.17E-02	3.46E-03
Filter	1Z / 1A	6/6/2024	Beta	pCi/M3	3.09E-02	2.52E-03	2.34E-02	4.35E-03
Filter	1Z / 1A	6/13/2024	Beta	pCi/M3	1.41E-02	1.91E-03	1.39E-02	3.67E-03
Filter	1Z / 1A	6/20/2024	Beta	pCi/M3	2.80E-02	2.39E-03	2.33E-02	4.35E-03
Filter	1Z / 1A	6/27/2024	Beta	pCi/M3	3.41E-02	2.66E-03	2.35E-02	4.84E-03
Filter	1Z / 1A	7/3/2024	Beta	pCi/M3	1.68E-02	2.35E-03	1.30E-02	4.31E-03
Filter	1Z / 1A	7/11/2024	Beta	pCi/M3	3.65E-02	2.61E-03	2.53E-02	4.45E-03
Filter	1Z / 1A	7/18/2024	Beta	pCi/M3	3.05E-02	2.50E-03	1.95E-02	4.71E-03
Filter	1Z / 1A	7/25/2024	Beta	pCi/M3	2.75E-02	2.41E-03	1.95E-02	5.08E-03
Filter	1Z / 1A	8/1/2024	Beta	pCi/M3	2.78E-02	2.44E-03	2.18E-02	4.76E-03
Filter	1Z / 1A	8/8/2024	Beta	pCi/M3	3.11E-02	2.53E-03	2.74E-02	4.78E-03
Filter	1Z / 1A	8/15/2024	Beta	pCi/M3	2.76E-02	2.60E-03	1.62E-02	3.85E-03
Filter	1Z / 1A	8/22/2024	Beta	pCi/M3	2.58E-02	2.40E-03	2.21E-02	4.50E-03
Filter	1Z / 1A	8/29/2024	Beta	pCi/M3	5.71E-02	3.20E-03	3.91E-02	5.30E-03
Filter	1Z / 1A	9/5/2024	Beta	pCi/M3	4.02E-02	2.86E-03	1.47E-02	4.24E-03
Filter	1Z / 1A	9/12/2024	Beta	pCi/M3	3.17E-02	2.58E-03	2.66E-02	5.04E-03
Filter	1Z / 1A	9/19/2024	Beta	pCi/M3	4.22E-02	2.86E-03	3.88E-02	5.53E-03
Filter	1Z / 1A	9/26/2024	Beta	pCi/M3	3.14E-02	2.51E-03	2.42E-02	4.95E-03
Filter	1Z / 1A	10/3/2024	Beta	pCi/M3	1.27E-02	1.91E-03	1.24E-02	3.76E-03
Filter	1Z / 1A	10/10/2024	Beta	pCi/M3	4.26E-02	2.82E-03	2.67E-02	4.92E-03
Filter	1Z / 1A	10/16/2024	Beta	pCi/M3	3.35E-02	2.63E-03	3.04E-02	5.53E-03
Filter	1Z / 1A	10/24/2024	Beta	pCi/M3	4.28E-02	2.50E-03	3.42E-02	4.98E-03
Filter	1Z / 1A	10/31/2024	Beta	pCi/M3	3.55E-02	2.50E-03	2.56E-02	4.82E-03
Filter	1Z / 1A	11/7/2024	Beta	pCi/M3	3.33E-02	2.41E-03	1.97E-02	4.59E-03
Filter	1Z / 1A	11/14/2024	Beta	pCi/M3	2.98E-02	2.49E-03	1.97E-02	4.31E-03
Filter	1Z / 1A	11/20/2024	Beta	pCi/M3	3.67E-02	2.96E-03	2.95E-02	5.13E-03
Filter	1Z / 1A	11/26/2024	Beta	pCi/M3	2.37E-02	2.47E-03	1.55E-02	4.61E-03

Table 21, Comparison of Gross Beta Results from Split Samples of 1Z and 1A

Interlaboratory Split Sample Results (Air Particulate Beta)

Media	Location	Sample Date	Beta	pCi/M3	(CGS)		(TBE)	
					1Z	±2σ	1A	±2σ
Filter	1Z / 1A	12/4/2024	Beta	pCi/M3	3.52E-02	2.42E-03	2.54E-02	4.23E-03
Filter	1Z / 1A	12/12/2024	Beta	pCi/M3	3.97E-02	2.61E-03	3.04E-02	4.63E-03
Filter	1Z / 1A	12/19/2024	Beta	pCi/M3	2.61E-02	2.32E-03	1.63E-02	3.95E-03
Filter	1Z / 1A	12/26/2024	Beta	pCi/M3	3.07E-02	2.50E-03	1.83E-02	4.01E-03
Filter	1Z / 1A	1/2/2025	Beta	pCi/M3	2.40E-02	2.26E-03	1.86E-02	4.05E-03

Table 22, Comparison of I-131 Results from Split Samples of 1Z and 1A

Charcoal	1Z /1A	Sample Date	I-131	pCi/M^3	1Z	1A
Charcoal	1Z /1A	1/04/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	1/11/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	1/18/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	1/25/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	1/31/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	2/08/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	2/14/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	2/22/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	2/28/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	3/07/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	3/14/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	3/20/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	3/27/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	4/04/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	4/11/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	4/18/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	4/25/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	5/01/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	5/9/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	5/15/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	5/23/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	5/29/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	6/06/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	6/13/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	6/20/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	6/26/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	7/03/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	7/10/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	7/18/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	7/24/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	8/01/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	8/08/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	8/15/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	8/22/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	8/29/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	9/05/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	9/12/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	9/19/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	9/26/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	10/03/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	10/10/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	10/17/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	10/24/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	10/30/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	11/07/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	11/13/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	11/20/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	11/26/2024	I-131	pCi/M^3	<MDA	<MDA

Table 22, Comparison of I-131 Results from Split Samples of 1Z and 1A						
Charcoal	**1Z /1A**	**Sample Date**	**I-131**	**pCi/M^3**	**1Z**	**1A**
Charcoal	1Z /1A	12/04/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	12/11/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	12/19/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	12/26/2024	I-131	pCi/M^3	<MDA	<MDA
Charcoal	1Z /1A	1/2/2025	I-131	pCi/M^3	<MDA	<MDA

Attachment 4, Environmental Direct Radiation Dosimetry Results

Monitoring Location	Quarterly Baseline, B_Q (mrem)	B_Q + MDD_Q (mrem)	Normalized Quarterly Monitoring Data, M_Q (mrem)				Quarterly Facility Dose, F_Q=M_Q-B_Q (mrem, or "ND" if $F_Q \leq MDD_Q$)				Annual Baseline, B_A (mrem)	B_A + MDD_A (mrem)	Annual Monitoring Data, M_A (mrem)	Annual Facility Dose, F_A=M_A-B_A (mrem, or "ND" if $F_A \leq MDD_A$)
			1	2	3	4	1	2	3	4				
P-TLD-14	23.2	28.6	21.3	18.7	21.1	22.0	ND	ND	ND	ND	92.8	105.9	83.1	ND
P-TLD-15	23.9	29.3	18.5	25.2	20.2	24.5	ND	ND	ND	ND	95.5	108.6	88.3	ND
P-TLD-16	23.4	28.8	21.1	20.8	20.5	22.1	ND	ND	ND	ND	93.7	106.8	84.6	ND
P-TLD-17	27.2	32.6	25.2	28.7	24.5	24.5	ND	ND	ND	ND	108.9	122.0	102.9	ND
P-TLD-18	23.9	29.3	21.3	21.5	21.6	23.7	ND	ND	ND	ND	95.5	108.6	88.1	ND
P-TLD-19	20.8	26.2	11.9	16.5	13.8	15.5	ND	ND	ND	ND	83.2	96.3	57.6	ND
P-TLD-1A	23.8	29.2	24.6	23.2	21.9	24.5	ND	ND	ND	ND	95.0	108.1	94.1	ND
P-TLD-1B	20.2	25.6	13.2	15.8	16.7	18.0	ND	ND	ND	ND	80.8	93.9	63.8	ND
P-TLD-1C	24.1	29.5	18.6	22.2	21.6	23.7	ND	ND	ND	ND	96.3	109.4	86.1	ND
P-TLD-1D	23.4	28.8	19.1	19.9	20.2	20.3	ND	ND	ND	ND	93.8	106.9	79.5	ND
P-TLD-1E	22.8	28.2	19.6	20.9	20.2	19.1	ND	ND	ND	ND	91.2	104.3	79.8	ND
P-TLD-1F	27.0	32.4	18.7	25.3	25.5	25.7	ND	ND	ND	ND	108.0	121.1	95.2	ND
P-TLD-1G	15.9	21.3	13.1	12.4	11.7	13.7	ND	ND	ND	ND	63.4	76.5	51.0	ND
P-TLD-1H	23.6	29.0	19.0	21.0	21.5	23.3	ND	ND	ND	ND	94.4	107.5	84.8	ND
P-TLD-1I	21.4	26.8	17.5	18.8	18.7	20.1	ND	ND	ND	ND	85.6	98.7	75.3	ND
P-TLD-1J	27.3	32.7	21.9	22.6	25.7	26.3	ND	ND	ND	ND	109	122.1	96.6	ND
P-TLD-1K	26.4	31.8	20.7	29.0	26.1	27.6	ND	ND	ND	ND	105.5	118.6	103.3	ND
P-TLD-1L	19.4	24.8	19.2	18.5	18.5	18.6	ND	ND	ND	ND	77.6	90.7	74.8	ND
P-TLD-1M	14.0	19.4	9.2	13.2	8.8	11.5	ND	ND	ND	ND	56.1	69.2	42.6	ND
P-TLD-1NN	25.5	30.9	20.1	22.7	22.7	23.3	ND	ND	ND	ND	102.1	115.2	88.7	ND
P-TLD-1P	16.1	21.5	12.4	14.9	13.9	15.3	ND	ND	ND	ND	64.6	77.7	56.6	ND
P-TLD-1Q	18.7	24.1	13.9	15.8	15.4	16.9	ND	ND	ND	ND	74.9	88.0	62.1	ND
P-TLD-1R	24.0	29.4	25.9	31.9	31.6	28.0	83.1	83.1	83.1	83.1	96.0	109.1	117.5	21.5
P-TLD-1T	24.1	29.5	18.0	21.5	20.6	22.8	ND	ND	ND	ND	96.5	109.6	83.0	ND
P-TLD-2	23	28.4	17.9	20.4	19.9	24.1	ND	ND	ND	ND	92.2	105.3	82.4	ND
P-TLD-22	24.3	29.7	19.8	23.3	22.4	21.7	ND	ND	ND	ND	97.0	110.1	87.2	ND
P-TLD-23	24.9	30.3	21.7	23.3	19.9	24.4	ND	ND	ND	ND	99.7	112.8	89.3	ND
P-TLD-24	18.1	23.5	13.4	13.7	11.2	13.8	ND	ND	ND	ND	72.3	85.4	52.1	ND
P-TLD-26	26.0	31.4	19.4	20.9	21.3	24.7	ND	ND	ND	ND	104.1	117.2	86.4	ND
P-TLD-27	24.7	30.1	18.8	22.4	20.2	24.3	ND	ND	ND	ND	98.8	111.9	85.7	ND

Monitoring Location	Quarterly Baseline, B_Q (mrem)	B_Q + MDD_Q (mrem)	Normalized Quarterly Monitoring Data, M_Q (mrem)				Quarterly Facility Dose, $F_Q=M_Q-B_Q$ (mrem, or "ND" if $F_Q \leq MDD_Q$)				Annual Baseline, B_A (mrem)	B_A + MDD_A (mrem)	Annual Monitoring Data, M_A (mrem)	Annual Facility Dose, $F_A=M_A-B_A$ (mrem, or "ND" if $F_A \leq MDD_A$)
			1	2	3	4	1	2	3	4				
P-TLD-2B	22.1	27.5	16.1	20.7	20.2	19.8	ND	ND	ND	ND	88.4	101.5	76.8	ND
P-TLD-31A	19.9	25.3	17.0	18.2	17.2	16.0	ND	ND	ND	ND	79.6	92.7	68.5	ND
P-TLD-32	25.4	30.8	20.0	22.6	19.0	24.5	ND	ND	ND	ND	101.7	114.8	86.1	ND
P-TLD-3A	17.3	22.7	13.0	16.3	13.4	16.6	ND	ND	ND	ND	69.3	82.4	59.4	ND
P-TLD-40	27.8	33.2	20.7	22.0	27.7	28.0	ND	ND	ND	ND	111.2	124.3	98.6	ND
P-TLD-42	21.0	26.4	15.1	13.4	10.5	18.0	ND	ND	ND	ND	84.2	97.3	57.0	ND
P-TLD-43	26.5	31.9	24.0	25.6	25.0	24.7	ND	ND	ND	ND	106.1	119.2	99.2	ND
P-TLD-44	22.8	28.2	17.4	20.3	18.4	21.6	ND	ND	ND	ND	91.3	104.4	77.7	ND
P-TLD-45	24.5	29.9	19.9	23.7	19.1	20.7	ND	ND	ND	ND	98.2	111.3	83.3	ND
P-TLD-46	21.0	26.4	18.3	18.4	19.5	20.9	ND	ND	ND	ND	84.2	97.3	77.0	ND
P-TLD-47	26.0	31.4	19.7	23.5	22.5	26.1	ND	ND	ND	ND	103.8	116.9	91.8	ND
P-TLD-48	24.3	29.7	19.8	21.6	23.4	23.4	ND	ND	ND	ND	97.1	110.2	88.3	ND
P-TLD-49	24.0	29.4	18.0	22.0	20.6	23.9	ND	ND	ND	ND	95.8	108.9	84.5	ND
P-TLD-4K	15.1	20.5	10.6	10.2	13.3	12.1	ND	ND	ND	ND	60.3	73.4	46.1	ND
P-TLD-5	22.0	27.4	23.1	19.2	18.7	18.9	ND	ND	ND	ND	87.8	100.9	79.9	ND
P-TLD-50	28.1	33.5	22.8	28.4	23.4	28.5	ND	ND	ND	ND	112.2	125.3	103.0	ND
P-TLD-51	23.6	29.0	17.4	22.1	23.3	19.6	ND	ND	ND	ND	94.5	107.6	82.4	ND
P-TLD-6B	19.8	25.2	15.7	17.4	17.2	17.0	ND	ND	ND	ND	79.1	92.2	67.4	ND

MDD_Q = Quarterly Minimum Differential Dose = 5.4 mrem
MDD_A = Annual Minimum Differential Dose = 13.1 mrem
ND = Not Detected, where $M_Q \leq (B_Q+MDD_Q)$ or $M_A \leq (B_A+MDD_A)$

Attachment 5: Radiological Groundwater Protection Program

1.0 Results Summary

Peach Bottom Generating Station has a total of 24 wells (three Background wells, four Long-Term Shutdown wells, five Mid-Field wells, three Perimeter wells, and nine Source wells), two bedrock seeps (monitored as Mid-Field sample points), and two yard drain locations (monitored as Source sample points), that are sampled as part of the Station RGPP (EN-PB-408-4160). Figure 1a shows the surface water and overburden aquifer RGPP sample locations and Figure 1b shows the bedrock aquifer RGPP sample locations.

RGPP sampling at the Station is performed by Constellation Generation Services, under contract to Constellation. Laboratory testing is performed by Teledyne Brown Engineering. The laboratory data, field data, and depth to water readings are uploaded to the RACER website, which is a data repository for the RGPP sampling rounds.

Note that previously obstructed monitoring well MW-PB-11 was recently found and in operable condition, east of MW- PB-30, near the Administration Building A. This well was sampled as part of the MW-PB-30 groundwater investigation. This well should be incorporated into the RGPP as a Mid-Field designated well since it is downgradient of MW-PB-30 and the southern Moisture-Separator Room.

<u>Tritium</u>

Peach Bottom has 24 monitoring wells, two bedrock seeps (monitored as Mid-Field sample points), and two yard drain locations (monitored as Source sample points) that are sampled for tritium. Samples collected from Source and Long-Term designated wells are analyzed for tritium quarterly; samples collected from Mid-Field designated wells are analyzed for tritium semi-annually, and samples collected from Background and Perimeter designated wells are analyzed for tritium annually.

The tritium concentration in a groundwater sample collected from MW-PB-30 on August 13, 2024 increased from 1,100 pCi/L to 112,000 pCi/L. Station personnel found that a penetration in a sump in the southern Moisture Separator Room allowed tritiated water to migrate to groundwater. Monitoring well MW-PB-30 is located approximately ten feet from the sump. The Station installed a barrier around the sump to stop water from entering. Tritium concentrations show a decreasing trend since the barrier was installed. As of September 24, 2024, the tritium concentration was 4,340 pCi/L. Although the tritium concentration spiked in the sample collected from MW-PB-30 during the 4th quarter 2024 RGPP round (29,700 pCi/L), tritium concentrations continue to show a decreasing trend since the barrier was installed. As of December 10,2024, the tritium concentration was 9,010 pCi/L.

<u>Gross-Alpha</u>

Gross-alpha analysis was most recently performed on Source and Long-Term Shutdown designated wells, during the 2nd quarter 2024 RGPP sampling round. Gross-alpha (dissolved and suspended) was not detected at concentrations greater than their respective Alert Levels in the samples collected during the 2nd quarter 2024 RGPP sampling round.

Per the RGPP, all Long-Term Shutdown and Source designated wells will have gross-alpha analysis performed again in 2026.

Gamma-Radionuclides

Gamma-radionuclide analysis has been performed on RGPP samples (quarterly to annually) at Peach Bottom Generating Station since 2006. This extensive sampling and analysis produced over 10,800 data records for the Station. Gamma-radionuclides have not been detected at concentrations greater than their respective LLDs, in RGPP samples submitted to the vendor laboratory since 2006. Therefore, in the 2020 RGPP, gamma- radionuclide analysis frequency was reduced from annual to every two years.

Gamma-radionuclide analysis was most recently performed during the 2nd quarter 2024 RGPP sampling round. Station-related gamma radionuclides were not detected at concentrations exceeding their respective LLDs in 2024. Per the RGPP, the next time gamma-radionuclide analysis will be performed is 2026.

Select Transuranics

Select transuranics analysis is procedurally required annually for former Elevated designated (current Source designated) well MW-PB-25. Additionally, EN-PB-408-4160 requires select transuranics analysis if a gross alpha concentration exceeds the Alert Level in a particular well, there is an unexpected increase in tritium activity, and if a non-tritium licensed material result exceeds the High Level as established by the RGPP.

U-233/234 was detected in the sample collected from MW-PB-25 at 0.4276 pCi/L, during the 2nd quarter 2024 RGPP sampling round; U-238 was also detected in the sample collected from MW-PB-25 at 0.2269 pCi/L. The detected uranium concentrations are similar to those reported in the past and are considered background concentrations because no Station related transuranics, gamma-radionuclides, Fe-55, Ni-63, and Sr-89/90 were detected in the sample collected from MW-PB-25. Table 2 provides a summary of select transuranics results (U-233/234 and U-238) since 2006.

Select transuranics analysis was performed on the sample collected from MW-PB-30 during the 3rd quarter 2024, due to the unexpected increase in tritium concentration to 112,000 pCi/L. Select transuranics were not detected in the MW-PB-30 sample collected in the 3rd quarter 2024.

Hard-to Detects (Fe-55 and Ni-63)

Hard-to-detect analysis (Fe-55 and Ni-63) is procedurally required annually for former Elevated designated (current Source designated) well MW-PB-25, as well as Long-Term Shutdown designated wells. As part of the current EN-PB-408-4160, hard-to-detect analysis is warranted on samples collected from Source designated wells once every 5 years, starting in 2021. Additionally, hard-to-detect analyses is required if there is an unexpected increase in tritium activity, and if a non-tritium licensed material result exceeds the High Level as established by the RGPP.

The 2nd quarter 2024 samples collected from Long-Term Shutdown designated well and Source designated well MW-PB-25, and the 3rd quarter 2024 sample collected from MW-PB-30, were analyzed for hard-to- detects (Fe-55 and Ni-63). Hard-to-detects (Fe-55 and Ni-63) were not detected in the samples collected during the 2nd and 3rd quarter 2024. Long-Term Shutdown designated wells will have Fe-55 and Ni-63 analysis performed in 2025. Source designated wells will have Fe-55 and Ni-63 analysis performed again in 2026.

Sr-89 and Sr-90

Sr-89 and Sr-90 have been an annual procedurally required analysis on Detection, Long-Term Shutdown, and Elevated designated wells since sample point designations became part of the RGPP in 2010. EN-PB-408-4160 states that Sr-89 and 90 analyses should be performed annually for Source and Long-Term Shutdown designated sample locations. If a positive result is reported, samples collected from wells with the Sr-89 and Sr-90 detections, will be analyzed quarterly to evaluate the activity in the area of the well.

In 2024, samples were collected from the eleven Source designated sample locations and four Long-Term Shutdown designated wells during the 2nd quarter 2024 RGPP sampling round and from MW-PB-30 during the 3rd quarter 2024 RGPP sampling round. Sr-89 and Sr-90 were not detected in the samples collected during the 2nd and 3rd quarter 2023 RGPP sampling round.

Precipitation Recapture

Peach Bottom Generating Station is a Boiling Water Reactor (BWR) generating station. The RGPP requires BWR generating stations to sample precipitation on a semi-annual basis. In 2020, the RGPP was modified to increase the minimum number of samples to eight recapture sample locations and to focus sample locations in areas close to atmospheric release points or areas that could receive atmospheric recapture. The RGPP states that a minimum of eight samples should be collected from within the protected area in a manner that surrounds the Turbine Building and Reactor Building as well as ancillary structures that could vent tritiated vapor to the atmosphere.

RGPP precipitation samples were collected in January and July 2024. Eight precipitation samples were collected across the Station during both sampling rounds. Tritium was detected at concentrations greater than 200 pCi/L in six of the sixteen recapture samples collected in 2024. The maximum tritium concentration was 380 pCi/L, in the sample collected from PB-P3.

- Figure 10, Surface Water and Overburden RGPP Monitoring Locations
- Figure 11, Bedrock Seep and Bedrock RGPP Monitoring Locations
- Figure 12, Precipitation Recapture Sample Locations

Figure 10, Surface Water and Overburden RGPP Monitoring Locations

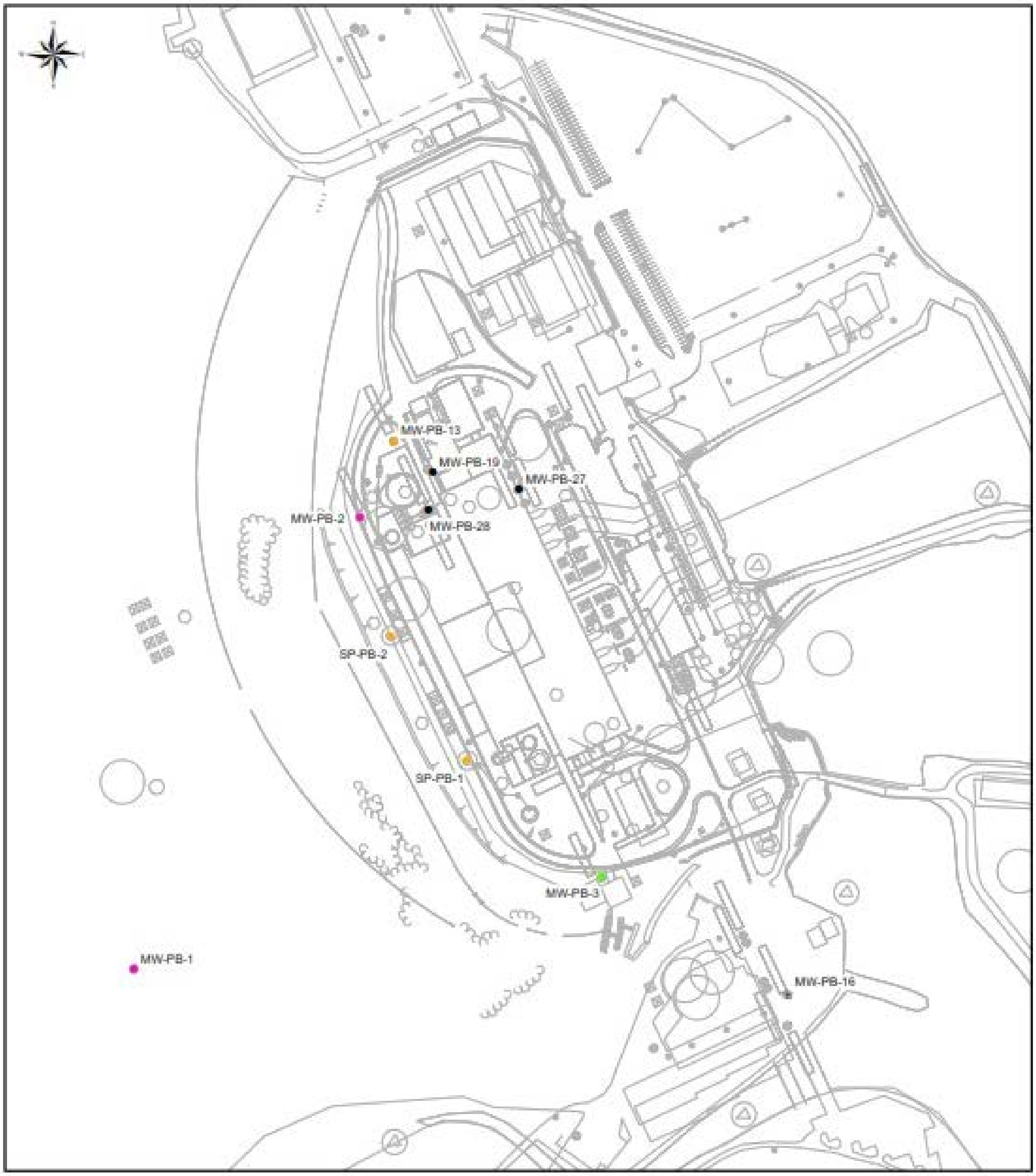

Figure 11, Bedrock Seep and Bedrock RGPP Monitoring Locations

Figure 12, Precipitation Recapture Sample Locations

Table 23, Groundwater Protection Results for the Specific Analytes Analysis Program

Complete RGPP Results (in pCi/L)

Location	Sample Date	Gross Alpha (dissolved)	Gross Alpha (suspended)	U-233/234	U-238	Sr-89/90	Gamma Emitters*	Ni-63
MW-PB-1	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
	12/10/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-10	6/5/24	1.44	3.03	ND	ND	<MDA	<MDA	<MDA
MW-PB-12	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-13	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-15	6/5/24	1.42	0.961	ND	ND	<MDA	<MDA	<MDA
MW-PB-16	6/5/24	10.3	14.3	ND	ND	<MDA	<MDA	<MDA
MW-PB-19	6/4/24	0.517	1.15	ND	ND	<MDA	<MDA	ND
MW-PB-2	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-20	6/4/24	2.23	2.8	ND	ND	<MDA	<MDA	ND
MW-PB-22	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-24	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-25	6/4/24	1.44	0.926	0.4276	0.2269	<MDA	<MDA	<MDA
MW-PB-26	6/4/24	2.83	1.15	ND	ND	<MDA	<MDA	ND
MW-PB-27	6/4/24	4.46	1.48	ND	ND	<MDA	<MDA	ND
MW-PB-28	6/4/24	1.17	4.44	ND	ND	<MDA	<MDA	ND
MW-PB-29	6/4/24	0.511	1.05	ND	ND	<MDA	<MDA	ND
MW-PB-3	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-30	6/4/24	0.47	1.12	ND	ND	<MDA	<MDA	ND
	8/16/24	ND	ND	<MDA	<MDA	<MDA	<MDA	<MDA
MW-PB-31	6/4/24	0.827	1.06	ND	ND	<MDA	<MDA	ND
MW-PB-4	6/4/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-7	6/5/24	ND	ND	ND	ND	ND	<MDA	ND
MW-PB-8	6/5/24	1.52	1.37	ND	ND	<MDA	<MDA	<MDA
U/2 YARD	6/7/24	1.3	1.05	ND	ND	<MDA	<MDA	ND
U/3 YARD	6/4/24	0.918	1.15	ND	ND	<MDA	<MDA	ND

ND No Data, Sample collected as required.

<MDA Less than minimum detectable activity.

Table 24, Groundwater Protection Results for Tritium

Concentration of Tritium in Groundwater (in pCi/L)

Location	Q1	Q2	Q3	Q4
U/2 YARD	<MDA	211	<MDA	<MDA
U/3 YARD	567	816	769	781
MW-PB-25	606	493	<MDA	238
MW-PB-12	ND	ND	249	268
MW-PB-22	ND	<MDA	ND	<MDA
MW-PB-10	<MDA	<MDA	<MDA	<MDA
MW-PB-15	<MDA	<MDA	<MDA	<MDA
MW-PB-20	<MDA	<MDA	<MDA	<MDA
MW-PB-31	<MDA	<MDA	220	567
MW-PB-4	ND	<MDA	ND	266
MW-PB-5	<MDA	<MDA	ND	ND
MW-PB-6	<MDA	<MDA	ND	ND
MW-PB-7	ND	201	ND	ND
MW-PB-8	<MDA	<MDA	<MDA	<MDA
MW-PB-24	ND	224	ND	<MDA
MW-PB-29	374	578	683	674
MW-PB-26	518	991	1,910	1,560
MW-PB-30	295	1,100	112,000* 2,480 4,340	29,700** 9,010
SP-PB-1	<MDA	<MDA	<MDA	216
SP-PB-2	<MDA	<MDA	<MDA	<MDA
MW-PB-19	279	<MDA	<MDA	<MDA
MW-PB-1	ND	<MDA	ND	ND
MW-PB-13	ND	ND	<MDA	294
MW-PB-16	<MDA	<MDA	<MDA	<MDA
MW-PB-2*	ND	<MDA	ND	ND
MW-PB-3	ND	<MDA	ND	ND
MW-PB-28	<MDA	300	<MDA	<MDA
MW-PB-27	1,040	1,770	4,110	2,600

ND No Data, Sample collected as required.
<MDA Less than minimum detectable activity.
* Sample was obtained on 8/13/24. MW-PB-30 was resampled on 8/16/24 and 9/24/24 for tritium values of 2,480 pCi/L and 4,340 pCi/L, respectively.
** First sample was obtained on 11/5/24 with a tritium concentration of 29,700 pCi/L, and the resample on 12/10/24 resulted in a tritium concentration of 9,010 pCi/L.

Table 25, Tritium Precipitation Results		
Concentration of Tritium in Precipitation Recapture (pCi/L)		
Location	2/21/2024	8/28/2024
PB-P1	<MDA	<MDA
PB-P2	<MDA	<MDA
PB-P3	<MDA	380
PB-P4	234	243
PB-P5	<MDA	<MDA
PB-P6	325	<MDA
PB-P7	317	<MDA
PB-P8	250	<MDA

<MDA Less than minimum detectable activity.