ATTACHMENT (1)

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT FOR THE

CALVERT CLIFFS NUCLEAR POWER PLANT

UNITS 1 AND 2

AND THE INDEPENDENT SPENT FUEL STORAGE INSTALLATION

Calvert Cliffs Nuclear Power Plant

May 15, 2025

Calvert Cliffs Nuclear Power Plant

2024

Annual Radiological Environmental Operating Report

Document Number: 50-317/50-318/72-8

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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

Calvert Cliffs Nuclear Power Plant Radiological Environmental Monitoring Program (REMP) was established in 1970 prior to the station becoming operational to provide information on background radiation present in the area. The goal of CCNPP 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 the Environmental Technical Specifications and the Independent Spent Fuel Storage Installation (ISFSI) Technical Specifications. The entire monitoring program in place around CCNPP is divided into three parts: the original REMP, the ISFSI monitoring program, and the Non-ODCM Radiological Environmental Monitoring 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 CCNPP for the reporting period of January 1st through December 31st, 2024. During that time period 1434 were performed on 1390 samples.

A dose assessment based on the onsite meteorological data and radwaste release information for this time period was performed. The results of these calculations indicate:

Gaseous Pathways

A maximum thyroid dose of $6.42E^{-05}$ mrem to a child via the plume, ground, vegetable, and inhalation pathways at 1.5 miles WSW of the containments at Calvert Cliffs. This is about 0.000000856% of the acceptable limit of 75 mrem/yr as specified in 40CFR190 and 10CFR72.104.

A maximum whole-body gamma dose of $5.64E^{-05}$ mrem to a child at 1.4 miles W of the containments at Calvert Cliffs. This is about 0.00000226% of the acceptable dose limit of 25 mrem/yr as specified in 40CFR190 and 10CFR72.104.

A maximum dose to any other organ, in this case skin, of $3.81E^{-05}$ mrem to a teen at 1.1 miles SW of the containments at Calvert Cliffs. This is about 0.00000152% of the acceptable dose limit of 25 mrem/yr as specified in 40CFR190 and 10CFR72.104.

Liquid Pathways

A maximum thyroid dose of $8.09E^{-04}$ mrem to a teen for all liquid pathways, which is about 0.00108% of the acceptable dose limit of 75 mrem/yr as specified in 40CFR190 and 10CFR72.104.

A maximum whole-body dose of $9.40E^{-04}$ mrem to a teen via all liquid pathways, which is about 0.00125% of the acceptable dose limit of 25 mrem/yr as stated in 40CFR190 and 10CFR72.104.

A maximum dose to any other organ, in this case GI, of $1.83E^{-03}$ mrem to an adult for all pathways, which is 0.00244% of the acceptable dose limit of 25 mrem/yr specified in 40CFR190 and 10CFR72.104.

Gaseous and Liquid Pathways Combined

A maximum thyroid dose of $8.73E^{-04}$ mrem via liquid and gaseous pathways, which is about 0.0000116% of the acceptable limit of 75 mrem/yr as specified in 40CFR190 and 10CFR72.104.

A maximum whole-body dose of $9.96E^{-04}$ mrem via liquid and gaseous pathways, which is about 0.0000399% of the acceptable limit of 25 mrem/yr as specified in 40CFR190 and 10CFR72.104.

A maximum calculated dose to all other organs via liquid and gaseous pathways was equal to $1.87E^{-03}$ mrem. This dose was about 0.0000747% of the allowable limit of 25 mrem/yr as specified in 40CFR190 and 10CFR72.104.

In all cases, the calculated doses are a small fraction of the applicable limits specified in 40CFR190 and 10CFR72.104.

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 CCNPP, did not result in detection of plant related radionuclides in the environment There was Facility related dose from the ISFSI observed at OSLDs located around the ISFSI. As spent fuel casks are installed during the year and due to the close proximity of these OSLDs to the spent fuel storage structures, they detect the small increase in radiation exposure each year. However, it is clear from the review of the results from the ISFSI and other REMP dosimeters when compared to control Dosimeters that there is no observable direct radiation exposure to the public.

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 CCNPP. 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. Detailed information on the exposure of the U.S. population to ionizing radiation can be found in NCRP Report No. 160 [1].

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].

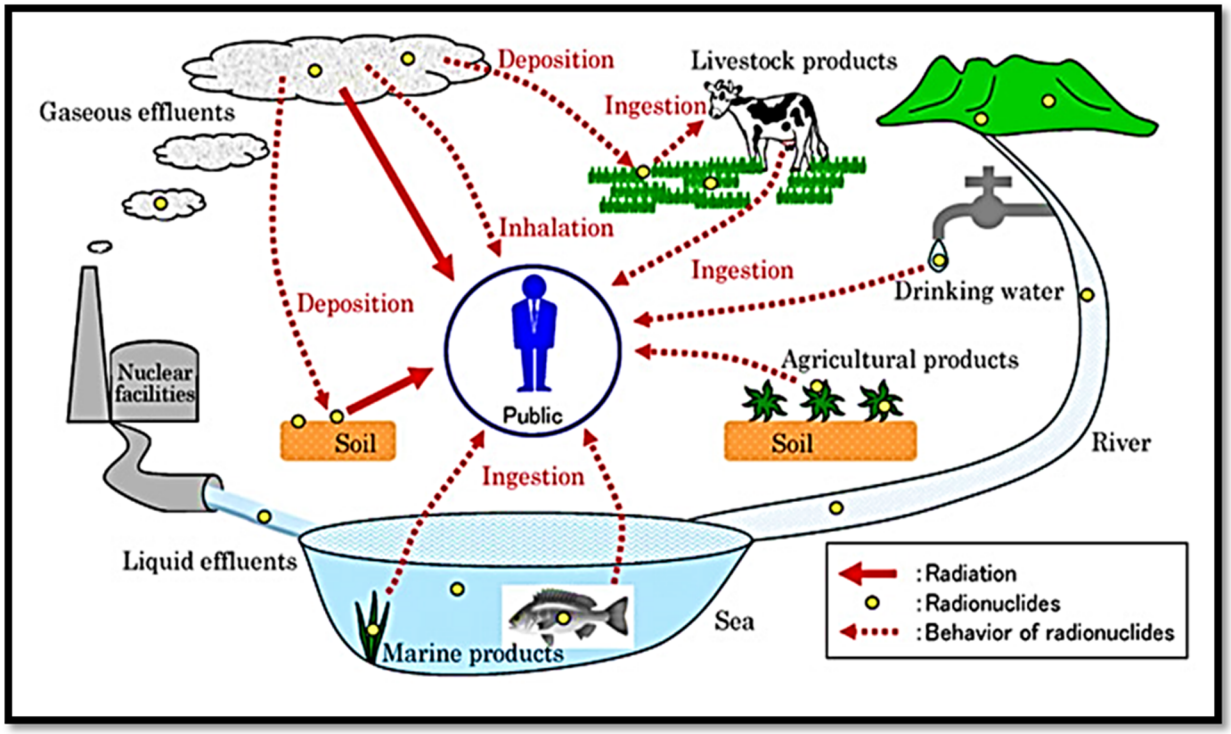


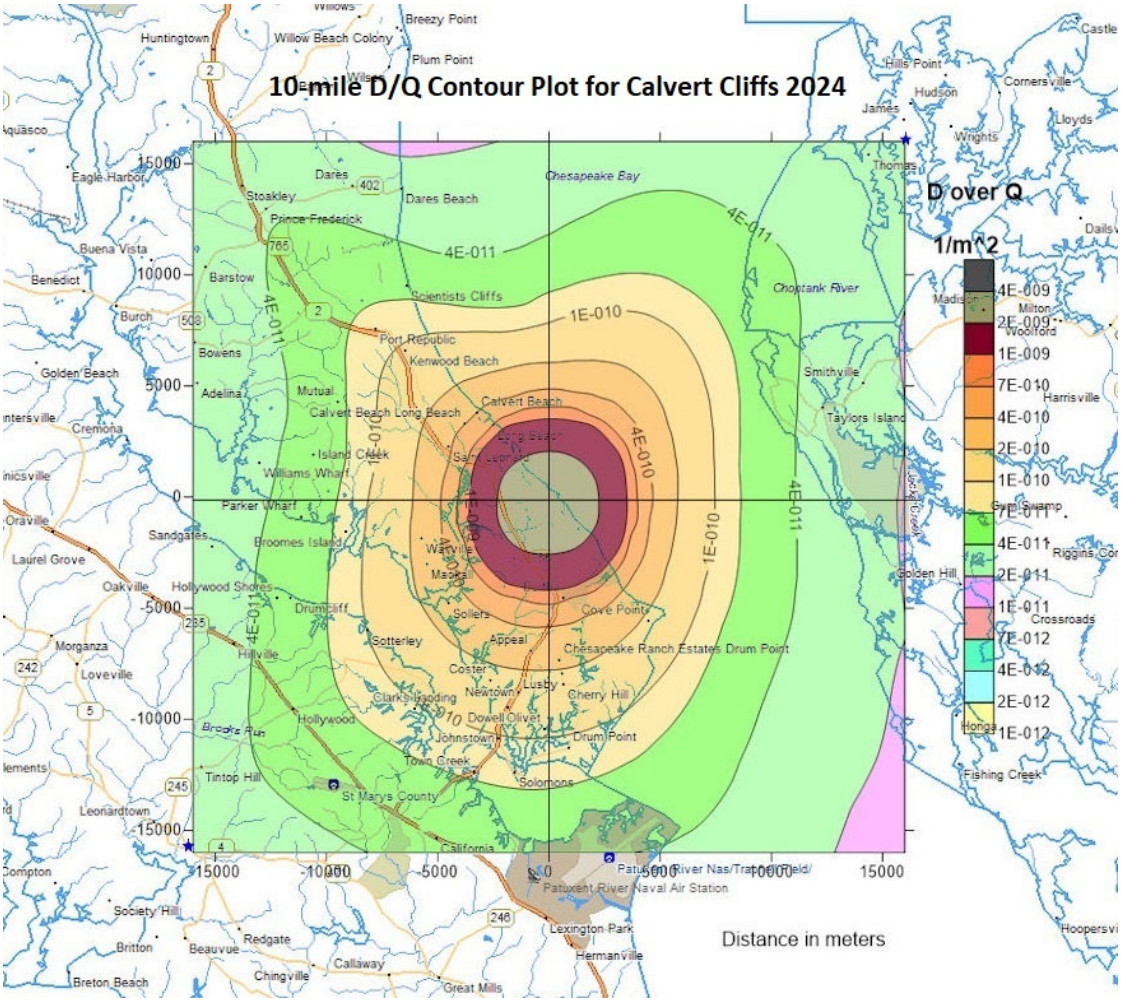
Figure 1: Potential exposure pathways to Members of the Public due to Plant Operations [7]

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 Maryland, CCNPP 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

Calvert Cliffs Nuclear Power Plant is a commercial nuclear power plant consisting of Unit 1 that achieved initial criticality on October 7, 1974, and Unit 2 that achieved criticality on November 30, 1976. The plant is located in Southern Maryland on the shore of the Chesapeake Bay. The surrounding area includes the Calvert Shore Sanctuary to the south, the community of White Sands to the west, and Saint Leonard to the North. All distance and direction measurements are from the center point between the two units and the nearest residence is two miles to the northwest. The plant effluents and meteorological data are used to plot the expected D/Q and displayed in the map below.



CCNPP 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 and ISFSI – Direct Radiation
- Table 2, Radiological Environmental Monitoring Program and ISFSI – Airborne
- Table 3, Radiological Environmental Monitoring Program and ISFSI – Waterborne and Terrestrial
- 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 Nearest Residence and Garden Locations

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REQUIREMENTS

Table 1: Radiological Environmental Monitoring Program and ISFSI – Direct Radiation

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Direct Radiation 23 Routine monitoring stations with two or more dosimeters placed as follows: An inner ring of stations, one in each compass sector in the general area of the site boundary. An outer ring of stations, one in each compass sector at approximately 5 miles from the site; and Special interest areas, such as population centers, nearby recreation areas, and control stations 19 additional ISFSI monitoring stations with two or more dosimeters placed in each sector around the centerpoint of the ISFSI and a Control location shared with REMP.	See Table 5	Quarterly	Gamma dose/Quarterly

Table 2: Radiological Environmental Monitoring Program and ISFSI – Airborne

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
<u>Airborne Radioiodine and Particulates</u> Samples from 5 locations for REMP and additional 4 locations common to REMP and ISFSI: Three locations (A1, A2, A3) close to the site boundary in different sectors of the highest calculated annual average ground level D/Q. One sample (A4) from the vicinity of a community having the highest calculated annual average D/Q. Additional indicator locations common to REMP and ISFSI monitoring, (SFA1, SFA3, SFA4) One sample (A5) from a Control Location, approximately 10 to 20 miles away in the least predominant wind direction One sample (SFA2) for air particulates only as a Control location for the ISFSI monitoring program	A1: On site before entrance to Camp Conoy. 0.5 miles S sector A2: Camp Conoy Rd., at emergency siren. 1.5 miles SSE sector A3: Bay Breeze Rd. 1.6 miles SE sector A4: Route 765, Lusby near Larry's Garage 1.8 miles SSW sector SFA1: Meteorological Station. 0.4 miles SW sector SFA3: NNW of ISFSI. 0.4 miles SSW sector SFA4: SSE of ISFSI. 0.5 miles SSW sector A5: Emergency Operations Facility. 12.1 miles 19.3 KM WNW sector SFA2: Visitor's Center – Overlook. 0.2 miles N sector	Continuous sampler operation with sample collection weekly	Particulate sampler: Analyze for gross beta radioactivity ≥ 24 hours following filter change / Weekly. Perform gamma isotopic analysis on each sample when gross beta activity is > 10 times the yearly mean of control samples. Perform gamma isotopic analysis on composite sample (by location)/Quarterly. Radioiodine canister: I-131 analysis/Weekly.

Table 3: Radiological Environmental Monitoring Program and ISFSI – Waterborne and Terrestrial

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Surface Water One sample upstream (Wa1) (control) and one sample downstream (Wa2) (indicator)	Wa1: at the intake area 0.1 miles NNE sector Wa2: at the discharge area 0.2 miles N sector	Composite sample over one-month period; samples from monthly composites are combined to form quarterly composite samples to be analyzed for H-3.	Gamma isotopic /Monthly, H-3 /Quarterly
Sediment from Shoreline One sample downstream area with existing or potential recreational value. (Wb1)	Wb1 Downstream of Discharge on site at Barge Road	Semiannual	Gamma isotopic Semiannually
Bottom Sediment (Supplemental) One sample downstream (indicator) One sample upstream (control)	Wbs2: Discharge area 0.2 miles N sector Wbs4: Camp Conoy/Rocky Point 1.9 miles SE sector	Semiannual	Gamma isotopic Semiannually
Soil (ISFSI) Four samples around the ISFSI in the vicinity of air samplers SFS1, SFS3, SFS4, and SFS5 (Indicator) One sample SFS2 (control)	SFS1: Meteorological Station NW of ISFSI SFS3: NNW of the ISFSI SFS4: SSE of the ISFSI SFS5: On Site before entrance to Camp Conoy 0.19 miles ESE sector SFS2: CCNPP Visitor's Center Overlook 0.5 miles N sector	Quarterly	Gamma isotopic Quarterly
Vegetation (ISFSI) Four samples around the ISFSI in the vicinity of air samplers SFB1, SFB3, SFB4, and SFB5 (Indicator) One sample SFB2 (control)	SFB1: Meteorological Station NW of ISFSI SFB3: NNW of the ISFSI SFB4: SSE of the ISFSI SFB5: On Site before entrance to Camp Conoy 0.19 miles ESE sector SFB2: CCNPP Visitor's Center Overlook 0.5 miles N sector	Quarterly	Gamma isotopic Quarterly

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: 3 samples of each commercially and recreationally important species (2 fish species and 1 invertebrate species) in vicinity of site discharge (Ia1, Ia2, Ia3). 3 samples of same species in areas not influenced by plant discharge Ia4, Ia5, Ia6).	Ia1, Ia2: Discharge Area 0.2 miles N sector Ia3: Camp Conoy 0.6 miles E sector Ia4, Ia5: Patuxent River, Area not influenced by Plant Discharge Ia6: Kenwood Beach 6.7 miles NNW sector	Sample in season, or semiannually if they are not seasonal	Gamma isotopic analysis on edible portions, each sample
Food Products: 3 different samples of broad leaf vegetation grown near the site boundary at two different locations of highest predicted annual average ground level D/Q, (Ib4, Ib5, Ib6, Ib10, Ib11, Ib12) 1 sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction (Ib7, Ib8, Ib9) control location.	Ib4, Ib5, Ib6: Onsite, before entrance to Camp Conoy 0.5 miles S sector Ib10, Ib11, Ib12: Meteorological Station 0.4 miles SW sector Ib7, Ib8, Ib9: Emergency Offsite Facility 12.1 miles WNW sector	Sample monthly during growing season	Gamma isotopic and I-131 analysis/ each sample

Table 5: REMP and ISFSI Sampling Locations – Direct Radiation

Site #	Location Type	Sector	Distance (Miles)[1]	Description
DR 01	Inner Ring	NW	0.4	On Site, along north cliffs, on tree
DR 02	Inner Ring	WNW	1.7	Route 765, along road at junk yard, on TP pole
DR 03	Inner Ring	W	1.4	Route 765, front of Plumbing business, on TP pole
DR 04	Inner Ring	WSW	1.2	Route 765, across from Vera's Beach Club, on TP pole
DR 05	Inner Ring	SW	1.5	Route 765, John's Creek, on TP pole
DR 06	Inner Ring	SSW	1.8	Route 765, Larry's Garage, on TP pole
DR 7*	Inner Ring	S	0.5	On Site, plant site garden
DR 8	Inner Ring	SSE	1.5	Camp Conoy Rd., near Emergency Siren
DR 9	Inner Ring	SE	1.6	Bay Breeze Rd., on TP pole
DR 10	Outer Ring	NW	4.0	Decatur & Calvert Beach Rds., on TP pole
DR 11	Outer Ring	WNW	4.1	Mackall & Parran Rds, 1 mile back dirt rd., on TP pole
DR 12	Outer Ring	W	4.2	Bowan & Mackall Rds., on TP pole
DR 13	Outer Ring	WSW	3.8	Mackall Rd., near Wallville, on TP pole
DR 14	Outer Ring	SW	4.0	Rodney Point, on TP pole
DR 15	Outer Ring	SSW	3.9	Mill Bridge & Turners Rds., on TP pole
DR 16	Outer Ring	S	4.1	Across from Appeal School, near rd., on TP pole

Table 5: REMP and ISFSI Sampling Locations – Direct Radiation

Site #	Location Type	Sector	Distance (Miles)[1]	Description
DR 17	Outer Ring	SSE	3.7	Cove Pt. & Little Cove Pt. Rds., on TP pole
DR 18	Outer Ring	SE	4.5	Cove Point, at entrance to Lighthouse, on TP pole
DR 19	Special Interest	NW	2.8	Long Beach Rd. on TP pole
DR 20	Special Interest	NNW	0.3	On Site, north of Overlook, behind jersey wall, on pole
DR 21	Control	WNW	12.1	Emergency Operations Facility, at air sampler
DR 22	Control	S	7.8	Solomons Isl., across road from Science College, on TP pole
DR 23	Control	ENE	7.7	Taylor's Island, Anderson's Property, on TP pole
DR30	ISFSI	NW	0.2	Meteorological Station
SFDR1	ISFSI	SW	0.1	Southwest of ISFSI
SFDR2	ISFSI	N	0.1	North of ISFSI
SFDR3	ISFSI	N	0.1	North of ISFSI
SFDR4	ISFSI	NE	<0.1	Northeast of ISFSI
SFDR5	ISFSI	E	<0.1	East of ISFSI
SFDR6	ISFSI	ESE	0.1	East Southeast of ISFSI
SFDR7	ISFSI	N	0.5	CCNPP Visitor's Center
SFDR8	ISFSI	NNW	0.1	North Northwest of ISFSI

Table 5: REMP and ISFSI Sampling Locations – Direct Radiation

Site #	Location Type	Sector	Distance (Miles)[1]	Description
SFDR9	ISFSI	SSE	0.1	South Southeast of ISFSI
SFDR10	ISFSI	NW	0.1	Northwest of ISFSI
SFDR11	ISFSI	WNW	0.1	West Northwest of ISFSI
SFDR12	ISFSI	WSW	<0.1	West Southwest of ISFSI
SFDR13	ISFSI	S	<0.1	South of ISFSI
SFDR14	ISFSI	SE	0.1	Southeast of ISFSI
SFDR15	ISFSI	ENE	<0.1	East Northeast of ISFSI
SFDR16	ISFSI	SW	<0.1	Southwest of ISFSI
SFDR17	ISFSI	NNE	0.1	North Northeast of ISFSI
SFDR18	ISFSI	W	< 0.1	West of ISFSI

[1] Distance and direction from the central point of the two containment buildings except when designated as ISFSI which are distance and direction to the centerpoint of the ISFSI.

*Common to REMP and ISFSI

6.0 MAPS OF COLLECTION SITES

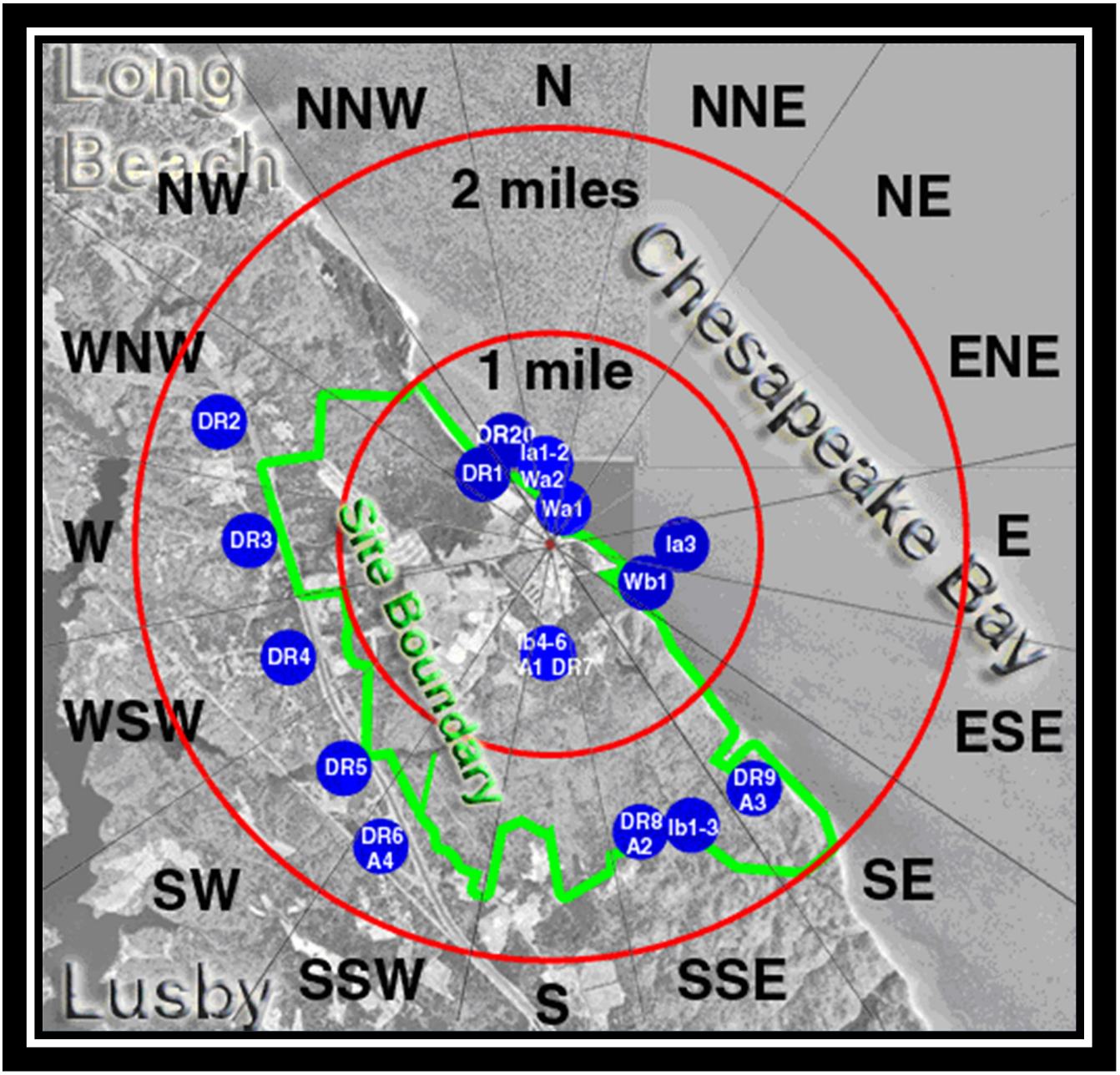


Figure 2: REMP Sample Locations (Near Field/Site Boundary)

Figure 3: REMP Sample Locations (Far Field)

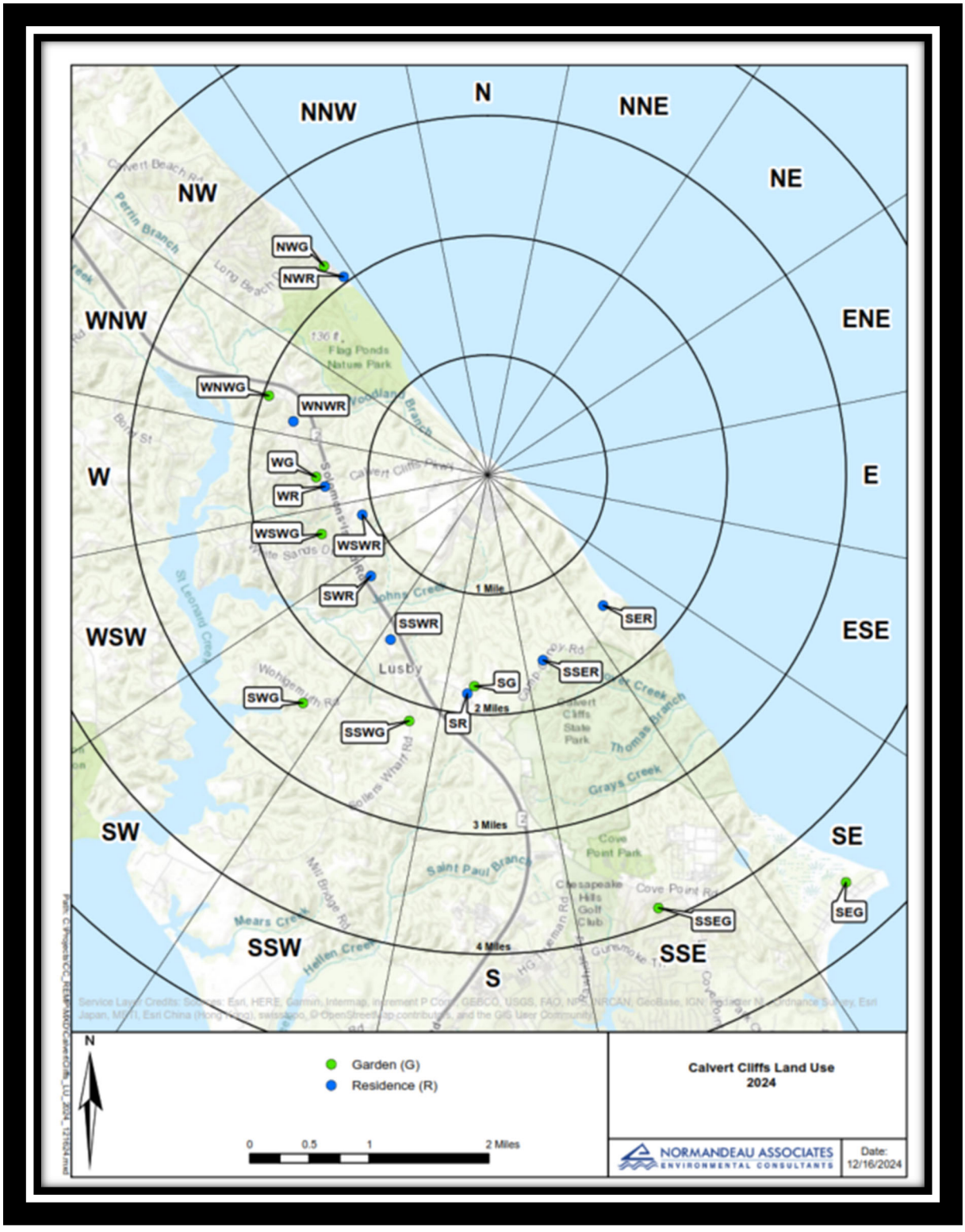


Figure 4: REMP Nearest Residence and Garden Locations

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: Lower Limits of Detection for Environmental Sample Analysis

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-Nb-95	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-La-140	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. Results from samples collected and analyzed during the year, 2024, are described below.

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. Calvert Cliffs Nuclear Power Plant (CCNPP) Radiological Effluent Control (REC) Program was established to limit the quantities of radioactive material that may be released based on calculated radiation doses or dose rates. Dose to Members of the Public due to radioactive materials released from the plant is limited by Appendix I of 10 CFR 50 and by 40 CFR 190. Operational doses to the public during 2024 were calculated to be very small compared to the limits required by regulation and compared to other sources of radiation dose and pose no health hazard.

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 42 REMP and ISFSI locations were monitored and data analyzed in accordance with the requirements in Table 1, Radiological Environmental Monitoring Program – Direct Radiation. Monitoring station locations are described in Table 5. REMP and ISFSI Sampling Locations – Direct Radiation. Attachment 4, Environmental Direct Radiation Dosimetry Results, provides the annual direct radiation dosimetry analyses. There was one location, DR04, where dosimeters were lost during the quarter and no data could be collected. This deviation is described in Table 9 Sample Deviation Summary.

There was no Facility-related dose detected at any of the 20 REMP indicator locations, DR01-DR20, in 2024 as a result of the operation of Units 1 and 2. There is a slight bias towards higher exposure at the 3 control locations, DR21, DR22, and DR23. This is due to higher natural background radiation at DR23 (Taylor's Island, 7.8 miles from CCNPP). This slight bias is due to normal variations in background radiation levels and is consistent with pre-operational data.

Facility-related dose was detected at 8 of the 19 indicator locations, NE of ISFSI (sample code SFDR4); East of ISFSI (sample code SFDR5); ESE of ISFSI (sample code SFDR6); SSE of ISFSI (sample code SFDR9); South of ISFSI (sample code SFDR13); SE of ISFSI (sample code SFDR14); ENE of ISFSI (sample code SFDR15); SW of ISFSI (sample code SFDR16). This is expected as additional spent fuel casks are generally installed at the ISFSI each year. The ISFSI OSLDs are located directly around the perimeter of the ISFSI. Due to the proximity of these OSLDs to the spent fuel storage structures, they detect the small increase in radiation exposure each year as compared to the control location, Visitor’s Center (SFDR07). The comparison table below summarizes the observed direct radiation at the ISFSI from spent fuel casks in storage there and 5 additional spent fuel casks that were transported to the ISFSI in 2024. The observed dose in those quarters when the casks were moved is higher and returns to a lower level in the quarters when no casks are being added to the ISFSI. It is clear from a review of the data in Attachment 4, Environmental Direct Radiation Dosimetry Results, that there is no observable direct radiation exposure to the public from the ISFSI, as the other REMP dosimeters (on-site, 4 miles, and beyond) show no observable increase in exposure when compared to control Dosimeters.

2024 ISFSI Facility-related Dose Quarterly (91-Day) Summary

Location Type	Mean Exposure (mrem)	Range (mrem)
Indicator Locations	72.6	21.9 - 174
Control Location	Not Detected	N/A
Highest Overall Location (SFDR14)	174	79.1 - 332

8.2 Air Particulate and Radioiodine Sample Results

Air particulate filters and charcoal canisters were collected from locations specified in Table 2, Radiological Environmental Monitoring Program and ISFSI – Airborne. During the calendar year 2024, a total of 972 samples were collected and analyzed for gross beta, gamma emitters and iodine. This includes 52 additional samples for radioiodine at SFA2 which are not required by the ISFSI or REMP but are included in sampling schedule for additional background monitoring of the site. 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.

All radioiodine samples were below the detection limit.

All air particulate samples contained detectable amounts of naturally occurring radionuclides within trend as compared to the control location. Gross beta activity at REMP indicator locations averaged $2.01E^{-2}$ pCi/m^3 and ranged from $6.72E^{-3}$ to $5.09E^{-2}$ pCi/m^3. This is comparable with the REMP control location A5 which averaged $2.09E^{-2}$ pCi/m^3 and ranged from $6.93E^{-3}$ to $3.98E^{-2}$ pCi/m^3.

Specific to the ISFSI, Gross beta activity at indicator locations averaged $2.03E^{-2}$ pCi/m^3 and ranged from $7.18E^{-3}$ to $4.80E^{-2}$ pCi/m^3. This is comparable with the ISFSI control location SFA2 which averaged $1.97E^{-2}$ pCi/m^3 and ranged from $7.16E^{-3}$ to $3.73E^{-2}$ pCi/m^3.

Gamma spectrometric analyses of all quarterly composited air particulate weekly samples exhibited no detectable concentrations of any plant-related radionuclides in any of these samples. Naturally occurring radionuclides, such as Be-7, were detected in nearly all samples.

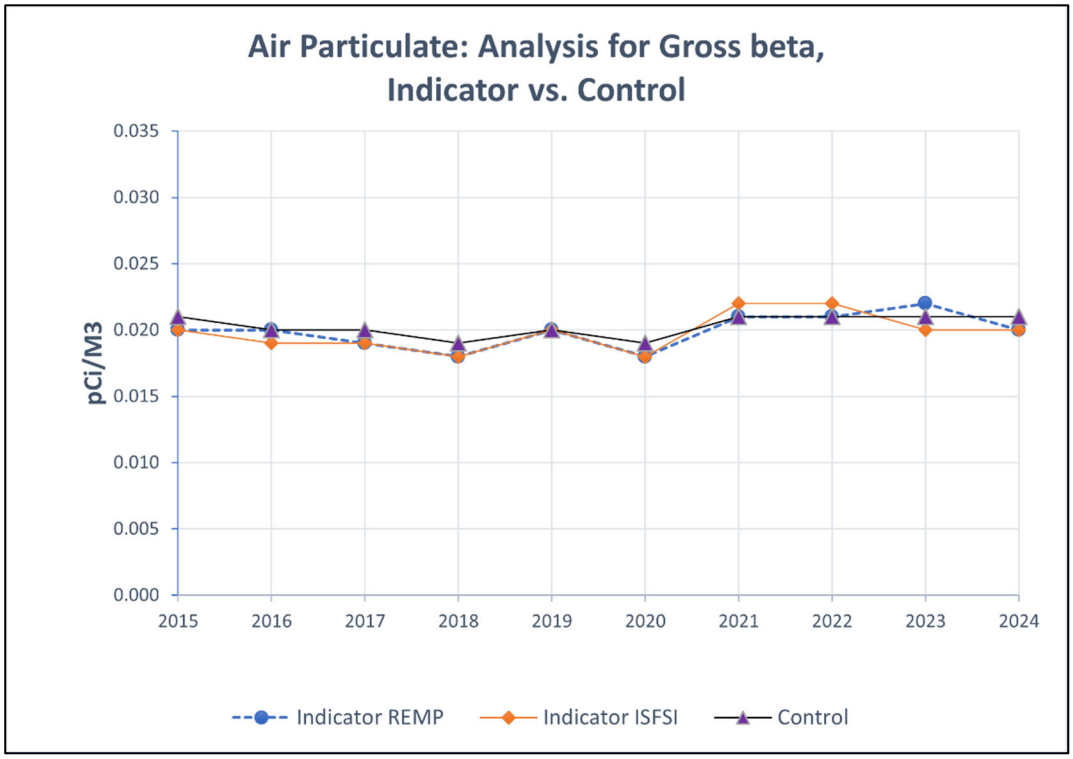


Figure 5: Air Particulate: Analysis for Gross Beta, Average for All Indicator vs. Control Location

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

8.3 Waterborne Sample Results

CCNPP is located on the shore of the Chesapeake Bay which is a brackish water source. As such there is no drinking water pathway for potential exposure to the public. There is also no groundwater pathway that could result in exposure to the public. There is contained onsite a geological groundwater system which is monitored as part of the onsite radiological groundwater monitoring program that is discussed in section 11.1 of this report.

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

Composite water samples are collected monthly at the upstream control location, CCNPP Intake (Wa1), and at the downstream indicator location, CCNPP Discharge (Wa2). 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 was detected in one sample during the year.

At the CCNPP Discharge (Wa2), collected from 12/28/2023 to 03/29/2024, tritium was observed at 740 ± 156pCi/L and is well below the reporting level of 20,000pCi/L. There were no other samples with detectable quantities of tritium.

Figure 6 compares tritium observed in the plant discharge and intake with annual effluent releases as reported in the Radioactive Effluent Release Report. Monthly analyses of bay water samples from both locations for gamma emitters exhibited no detectable concentrations of any plant-related radionuclides. There is no drinking water pathway for tritium in the brackish Chesapeake Bay water.

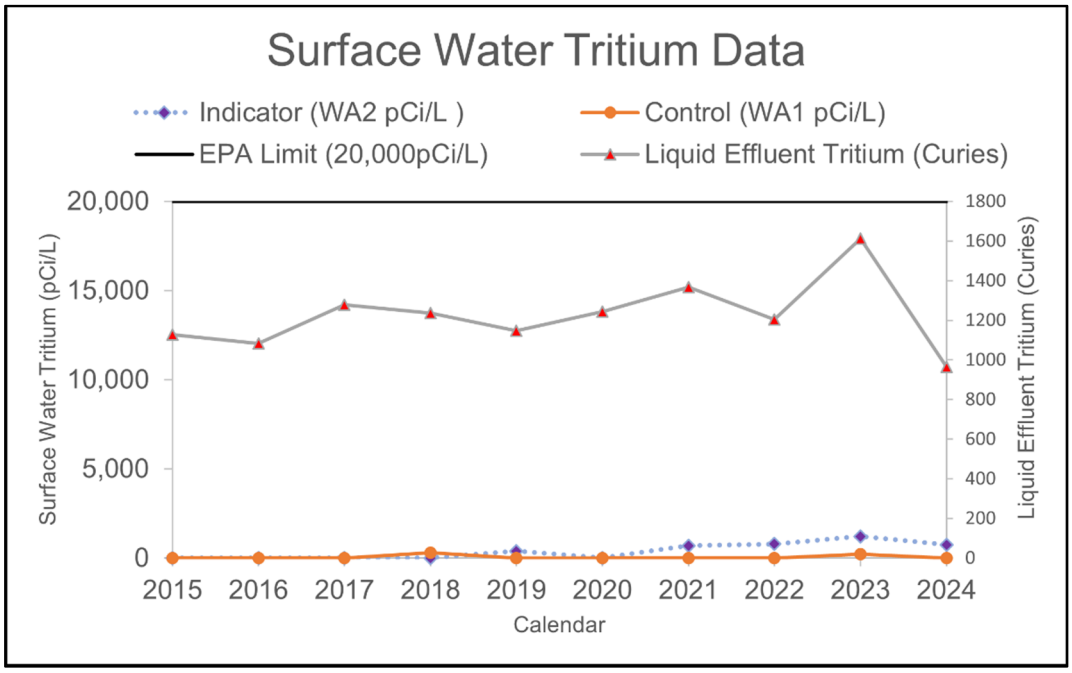


Figure 6: Surface Water Tritium Results

8.3.2 REMP Shoreline Sediment

Shoreline sediment collections were made in June and October 2024 and analyzed for gamma-emitting isotopes. The semiannual samples are collected at one location at Barge Road (Wb1). A total of 2 shoreline samples were analyzed in accordance with requirements in the ODCM and shown in Table 3, Radiological Environmental Monitoring Program and ISFSI – Waterborne and Terrestrial.

Gamma spectrometric analyses of these samples exhibited naturally occurring radionuclides, but no detectable concentration of any plant-related radionuclides.

8.3.3 Bottom Sediment

Bottom sediment collections were made in June and October 2024 and analyzed for gamma-emitting isotopes. The semiannual samples are collected at two locations at CCNPP Discharge Area (WBS2) 0.2 miles from the centerpoint of units 1 and 2 in the North sector. The second location is at Camp Conoy/Rocky Point (WBS4) 1.9 miles from the centerpoint of units 1 and 2 in the SE sector. A total of 4 bottom sediment samples were analyzed as supplemental monitoring and shown in Table 3, Radiological Environmental Monitoring Program and ISFSI – Waterborne and Terrestrial.

Gamma spectrometric analyses of these samples exhibited naturally occurring radionuclides, but no detectable concentration of any plant-related radionuclides.

8.4 Ingestion Pathway Sample Results

8.4.1 Fish

A total of 4 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. Only the edible portions are analyzed excluding head, tail, bones.

Samples of fish, when in season, are normally collected from the Discharge Area (sample codes IA1 and IA2) and from the Patuxent River (sample codes IA4 and IA5). As shown in Table 13, Spanish Mackerel and Blue Fish were obtained to meet the annual requirement.

Gamma spectrometric analyses of the fish exhibited naturally occurring K-40 but no detectable concentrations of any plant-related radionuclides.

8.4.2 Invertebrates - Oysters

A total of 8 oyster 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. Only the edible portions are analyzed excluding shell fragments.

Oyster samples were obtained quarterly from Camp Conoy (sample code IA3) to the south and Kenwood Beach (IA6) to the north.

Gamma spectrometric analyses of the oysters exhibited naturally occurring K-40 but no detectable concentrations of any plant-related radionuclides.

8.4.3 Food Products – Leafy Vegetation

In accordance with the ODCM and as described in Table 4, Radiological Environmental Monitoring Program – Ingestion, 36 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 emitters and I-131 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. While Cs-137 is periodically found in vegetation samples, the historical relationship between the indicator and control locations demonstrate that the plant is not the source of activity detected.

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. NUREG-1301/1302 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 the nearest milk animal, the nearest residence and the nearest garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation.

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. In summary, the Land Use Census was performed as required in the 9 meteorological sectors over land. The locations for nearest residence did not change following the 2024 census. The nearest garden in the WNW sector changed in 2024 from 1.7 miles to 1.9 miles from the center line of containment. There are no animals producing milk for public consumption within the 5-mile radius. There were goats observed at three farms in SW, SSW, and a farm that spans the W and WNW sectors. They were identified as family pets and not used for milk, or dairy consumption. One of the farms did identify that goats were occasionally used for meat consumption. Beef cattle were identified at five farms in the SSW, S, WSW, and a farm that spans the W and WNW sectors. There are no cows producing milk for human consumption within the 5-mile radius. There is no evidence of licensed milk-producing farm animals inside the 10-mile Emergency Planning Zone (EPZ). This was confirmed with the local agricultural officials of the Calvert County Farm Bureau and Government.

Table 8: Land Use Census – Nearest Receptors within 5 miles			
Sector	**Direction**	**Nearest Residence (Miles)**	**Nearest Garden (Miles)**
A	N	ND	ND
B	NNE	ND	ND
C	NE	ND	ND
D	ENE	ND	ND
E	E	ND	ND
F	ESE	ND	ND
G	SE	1.5	4.5
H	SSE	1.6	3.9
J	S	1.6	1.8
K	SSW	1.6	2.2
L	SW	1.1	2.4
M	WSW	1.2	1.5
N	W	1.3	1.4
P	WNW	1.7	1.9*
Q	NW	2.0	2.1
R	NNW	ND	ND
ND is used to designate sectors over water. Due to CCNPP's proximity to the Chesapeake Bay, the sectors do not have land use receptors so there is No Data (ND). *An asterisk denotes a change in this sector since the 2023 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
OSLD / Dosimetry	DR04	Quarter 1 2024	Dosimeters and cage were missing on arrival for servicing due to the telephone pole they were placed on had been replaced during the quarter.	Entered into corrective action tracking to document occurrence.

11.0 OTHER SUPPLEMENTAL INFORMATION

11.1 NEI 07-07 Onsite Radiological Groundwater Monitoring Program

Calvert Cliffs Nuclear Power Plant 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, samples and results taken in support of NEI 07-07 on-site groundwater monitoring program are separate from the Radiological Environmental Monitoring Program (REMP). Results of the NEI 07-07 Radiological Groundwater Monitoring Program for onsite groundwater wells are provided in Attachment 5, Table 15 Radiological Groundwater Protection Program.

11.2 Independent Spent Fuel Storage Installation (ISFSI) Monitoring Program

In August 1990 BGE initiated a program of additional radiological environmental monitoring around the site for the Independent Spent Fuel Storage Installation (ISFSI). The first dry fuel storage canister was loaded into the ISFSI in November of 1993 with more canisters being loaded in subsequent years. In 2021, the site transitioned to Holtec Hi-storm (Holtec International Storage Module) vertically ventilated storage overpack system for Independent Spent Fuel Storage installation. In 2024 there were five such canisters of spent fuel transferred to the ISFSI.

Results of the monitoring program for the ISFSI for the current period are included in this report. The results were compared with that generated during the previous ISFSI pre-operational periods and the current and previous CCNPP REMP periods.

In 2024 there were 280 analysis performed on 260 weekly composite air particulate filter samples were collected from five locations during the period. These locations are On Site Before the Entrance to Camp Conoy (sample code A1), Meteorological Station (sample code SFA1), CCNPP Visitor's Center (sample code SFA2), NNW of the ISFSI (sample code SFA3), and SSE of the ISFSI (sample code SFA4). Sample locations A1, SFA1, SFA3, and SFA4 are in common with CCNPP REMP Program as shown in Table 2. Radiological Environmental Monitoring Program and ISFSI – Airborne. All samples were analyzed for beta radioactivity and gamma emitting radionuclides.

Weekly analyses for beta activity on air particulate filters collected from all five locations showed values characteristic of levels routinely observed in the REMP. These values ranged from $7.18E^{-3}$ to $4.80E^{-2}$ pCi/m^3 for the indicator locations and $7.16E^{-3}$ to $3.73E^{-2}$ pCi/m^3 for the control location. The location with the highest overall mean of $2.11E^{-2}$ pCi/m^3 was SFA4, SSW of the ISFSI.

Gamma spectrometric analyses of the quarterly composite filter samples exhibited naturally occurring radionuclides, but no detectable concentration of any plant-related radionuclides.

A total of 40 vegetation and soil samples were analyzed from locations shown in Table 3, Radiological Environmental Monitoring Program and ISFSI – Waterborne and Terrestrial. The terrestrial environment was monitored by analyzing 5 samples of vegetation, SFB1, SFB2, SFB3, SFB4, SFB5 and 5 samples of soil, SFS1, SFS2, SFS3, SFS4, SFS5 collected quarterly from the vicinity of the air sampling locations surrounding the ISFSI.

No detectable concentrations of plant-related radionuclides were found in any of these samples. Naturally occurring radionuclides such as K-40 were detected in all samples.

A network of OSLDs is deployed quarterly at 19 indicator locations and one control location as shown in Table 1, Radiological Environmental Monitoring Program and ISFSI – Direct Radiation. The ISFSI locations are SFDR1-SFDR6, SFDR8-SFDR18, DR30 placed around the perimeter of the ISFSI. In addition, DR7 (On Site Before the Entrance to Camp Conoy) is common to both the CCNPP REMP Program and the ISFSI Program. The control location at the Visitor's Center, SFDR7. Details of these results are discussed in 8.1 Direct Radiation of this report and data reported in Attachment 4 Environmental Direct Radiation Dosimetry Results.

11.3 Corrections to Previous Reports

There are no errata to report at this time.

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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[5]	Location with Highest Annual Mean		Control Mean[5] (f^6). Range[5]	Number of Nonroutine Reported Measurements
				Name Distance and Direction	Mean[5] (f^6) Range[5]		
Air Particulates (pCi/m^3) REMP	Beta, 416	0.01	$2.01E^{-2}$ (364/364) $6.72E^{-3}$ – $5.09E^{-2}$	SFA4 SSE of ISFSI. 0.5 miles SSW	2.11 (52/52) $9.18E^{-3}$ – $4.06E^{-2}$	$2.09E^{-2}$ (52/52) $6.93E^{-3}$ - $3.98E^{-2}$	0
Air Particulates (pCi/m^3) ISFSI	Beta, 260	0.01	$2.03E^{-2}$ (208/208) $7.18E^{-3}$ – $4.80E^{-2}$	SFA4 SSE of ISFSI. 0.5 miles SSW	2.11 (52/52) $9.18E^{-3}$ – $4.06E^{-2}$	$1.97E^{-2}$ (52/52) $7.16E^{-3}$ - $3.73E^{-2}$	0
Direct Radiation (mrem/qtr.)	Gamma Dose, 334	N/A	33.0 (64/304) 9.41 - 192	SFDR14 SSE of ISFSI 0.1miles SE	192(8/8) 97.1 – 350	13.0 (16/16) 11.3 – 16.2	0
Surface Water (pCi/L)	Tritium, 8	200	740 (1/4) 740 +/- 156	Wa2 CCNPP Discharge 0.2 miles N	740 (1/4) 740 +/- 156	<MDA	0

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

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

Due to the overall complexity and variation in REMP designs across the industry, it is not feasible to prescribe a certain format that will fit all situations at a given plant or across the industry.

The expectation for all licensees is to present data in an understandable format, that allows for trending of results over time. Sample results are grouped within tables by sample frequency and media type and sorted by sample period:

1. Table 10: Monthly Waterborne Sample Results

2. Table 11 Weekly Airborne Sample Results

3. Table 12 Quarterly Isotopic Sample Results

4. Table 13 Complete REMP Results

Table 10: Monthly Sampling Bay Water (pCi/L) and Garden Vegetation (pCi/kg)

Monthly Radionuclides in Bay Water (pCi/L)				
Location	WA1 (Intake)		WA2 (Discharge)	
Date	Gamma Emitters	Tritium 1	Gamma Emitters	Tritium 1
1/31/2024	*	*	*	740 ± 156
3/1/2024	*		*	
3/29/2024	*		*	
4/30/2024	*	*	*	*
5/31/2024	*		*	
6/28/2024	*		*	
8/1/2024	*	*	*	*
8/30/2024	*		*	
9/27/2024	*		*	
11/1/2024	*	*	*	*
11/29/2024	*		*	
1/2/2025	*		*	

* All Non-Natural Radionuclides <MDA

[1] Monthly samples composited for a Quarterly Tritium analysis

Table 10 Continued: Monthly Sampling Bay Water (pCi/L) and Vegetation (pCi/kg)

Monthly Radionuclides in Vegetation (pCi/kg)			
Sample Code	Date	Sample Type	Gamma Emitters
IB4	6/24/2024	Kale	*
(Control)	7/22/2024	Kale	*
	8/19/2024	Kale	*
	9/16/2024	Kale	*
IB5	6/24/2024	Cabbage	*
(Control)	7/22/2024	Cabbage	*
	8/19/2024	Cabbage	*
	9/16/2024	Cabbage	*
IB6	6/24/2024	Collards	*
(Control)	7/22/2024	Collards	*
	8/19/2024	Collards	*
	9/16/2024	Collards	*
IB7	6/24/2024	Kale	*
	7/22/2024	Kale	*
	8/19/2024	Kale	*
	9/16/2024	Kale	*
IB8	6/24/2024	Cabbage	*
	7/22/2024	Cabbage	*
	8/19/2024	Cabbage	*
	9/16/2024	Cabbage	*

Table 10 Continued: Monthly Sampling Bay Water (pCi/L) and Vegetation (pCi/kg)

Monthly Radionuclides in Vegetation (pCi/kg)			
Sample Code	Date	Sample Type	Gamma Emitters
IB9	6/24/2024	Collards	*
	7/22/2024	Collards	*
	8/19/2024	Collards	*
	9/16/2024	Collards	*
IB10	6/24/2024	Kale	*
	7/22/2024	Kale	*
	8/19/2024	Kale	*
	9/16/2024	Kale	*
IB11	6/24/2024	Cabbage	*
	7/22/2024	Cabbage	*
	8/19/2024	Cabbage	*
	9/16/2024	Swiss Chard	*
IB12	6/24/2024	Collards	*
	7/22/2024	Collards	*
	8/19/2024	Collards	*
	9/16/2024	Collards	*
* All Non-Natural Radionuclides <MDA			

Table 11: Weekly Air Monitoring Particulate and I-131 Filters (pCi/m3)

Weekly Air Monitoring Particulate Filters (pCi/m3)										
	A1		A2		A3		A4		A5 (Control)	
Date	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)
1/8/2024	1.80E-02	1.34E-03	1.73E-02	1.36E-03	1.48E-02	1.28E-03	1.61E-02	1.32E-03	1.66E-02	1.35E-03
1/16/2024	2.65E-02	1.40E-03	2.52E-02	1.36E-03	2.45E-02	1.37E-03	2.47E-02	1.38E-03	2.36E-02	1.32E-03
1/22/2024	2.45E-02	1.60E-03	2.36E-02	1.60E-03	2.17E-02	1.58E-03	2.35E-02	1.63E-03	2.39E-02	1.60E-03
1/29/2024	1.06E-02	1.06E-03	1.11E-02	1.09E-03	1.06E-02	1.09E-03	9.33E-03	1.05E-03	1.22E-02	1.12E-03
2/5/2024	1.67E-02	1.24E-03	1.48E-02	1.20E-03	1.42E-02	1.21E-03	1.34E-02	1.18E-03	1.63E-02	1.24E-03
2/12/2024	1.78E-02	1.25E-03	1.84E-02	1.27E-03	1.70E-02	1.22E-03	1.88E-02	1.29E-03	1.77E-02	1.26E-03
2/19/2024	2.40E-02	1.44E-03	2.20E-02	1.39E-03	2.13E-02	1.38E-03	2.16E-02	1.38E-03	2.14E-02	1.35E-03
2/26/2024	2.42E-02	1.45E-03	2.40E-02	1.45E-03	2.07E-02	1.36E-03	2.44E-02	1.45E-03	2.55E-02	1.51E-03
3/4/2024	1.94E-02	1.30E-03	2.00E-02	1.34E-03	1.86E-02	1.28E-03	2.00E-02	1.34E-03	2.04E-02	1.35E-03
3/11/2024	7.92E-03	9.49E-04	6.72E-03	9.01E-04	7.12E-03	9.68E-04	7.86E-03	9.46E-04	6.93E-03	9.10E-04
3/18/2024	2.85E-02	1.56E-03	2.74E-02	1.54E-03	2.57E-02	1.50E-03	2.66E-02	1.52E-03	2.77E-02	1.56E-03
3/25/2024	1.57E-02	1.18E-03	1.72E-02	1.24E-03	1.60E-02	1.19E-03	1.63E-02	1.20E-03	1.60E-02	1.20E-03
4/1/2024	2.07E-02	1.34E-03	1.72E-02	1.26E-03	2.04E-02	1.35E-03	1.84E-02	1.29E-03	1.94E-02	1.34E-03
4/8/2024	8.36E-03	1.01E-03	8.03E-03	9.80E-04	7.69E-03	9.68E-04	8.46E-03	9.96E-04	7.91E-03	9.68E-04
4/15/2024	1.73E-02	1.23E-03	1.68E-02	1.23E-03	1.59E-02	1.20E-03	1.66E-02	1.22E-03	1.73E-02	1.24E-03
4/22/2024	1.80E-02	1.28E-03	1.74E-02	1.27E-03	1.56E-02	1.21E-03	1.69E-02	1.26E-03	1.64E-02	1.25E-03
4/29/2024	1.97E-02	1.30E-03	1.98E-02	1.31E-03	1.88E-02	1.29E-03	1.91E-02	1.29E-03	1.83E-02	1.28E-03
5/6/2024	1.60E-02	1.20E-03	1.45E-02	1.18E-03	1.44E-02	1.16E-03	1.49E-02	1.19E-03	1.51E-02	1.20E-03
5/13/2024	1.19E-02	1.08E-03	1.18E-02	1.14E-03	1.11E-02	1.08E-03	1.26E-02	1.13E-03	1.17E-02	1.12E-03
5/20/2024	1.28E-02	1.12E-03	1.25E-02	1.12E-03	1.28E-02	1.12E-03	1.20E-02	1.11E-03	1.18E-02	1.11E-03

Weekly Air Monitoring Particulate Filters (pCi/m3)										
	A1		A2		A3		A4		A5 (Control)	
Date	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)
5/28/2024	1.93E-02	1.19E-03	1.71E-02	1.28E-03	1.66E-02	1.13E-03	1.80E-02	1.18E-03	2.02E-02	1.26E-03
6/3/2024	1.93E-02	1.45E-03	1.67E-02	1.38E-03	1.66E-02	1.37E-03	1.88E-02	1.45E-03	1.80E-02	1.46E-03
6/10/2024	1.95E-02	1.35E-03	1.85E-02	1.32E-03	1.76E-02	1.29E-03	1.86E-02	1.32E-03	1.85E-02	1.35E-03
6/17/2024	1.67E-02	1.25E-03	1.65E-02	1.26E-03	1.45E-02	1.19E-03	1.66E-02	1.26E-03	1.71E-02	1.27E-03
6/24/2024	1.67E-02	1.27E-03	1.63E-02	1.26E-03	1.30E-02	1.17E-03	1.44E-02	1.21E-03	1.53E-02	1.25E-03
7/1/2024	1.57E-02	1.19E-03	1.74E-02	1.27E-03	1.47E-02	1.19E-03	1.48E-02	1.19E-03	1.76E-02	1.32E-03
7/8/2024	2.02E-02	1.38E-03	1.88E-02	1.33E-03	1.68E-02	1.29E-03	1.78E-02	1.31E-03	2.00E-02	1.39E-03
7/15/2024	1.62E-02	1.24E-03	1.44E-02	1.20E-03	1.44E-02	1.20E-03	1.43E-02	1.20E-03	1.59E-02	1.26E-03
7/22/2024	3.19E-02	1.66E-03	3.01E-02	1.64E-03	2.44E-02	1.50E-03	3.10E-02	1.63E-03	2.81E-02	1.57E-03
7/29/2024	1.92E-02	1.32E-03	1.63E-02	1.25E-03	1.67E-02	1.26E-03	1.68E-02	1.27E-03	1.76E-02	1.31E-03
8/5/2024	2.41E-02	1.46E-03	2.37E-02	1.46E-03	2.29E-02	1.44E-03	2.40E-02	1.47E-03	2.33E-02	1.45E-03
8/12/2024	1.73E-02	1.29E-03	1.56E-02	1.24E-03	1.52E-02	1.24E-03	1.39E-02	1.19E-03	1.67E-02	1.27E-03
8/19/2024	2.56E-02	1.49E-03	2.29E-02	1.43E-03	2.11E-02	1.38E-03	2.45E-02	1.47E-03	2.46E-02	1.47E-03
8/26/2024	1.99E-02	1.35E-03	1.71E-02	1.28E-03	1.61E-02	1.25E-03	1.76E-02	1.29E-03	1.82E-02	1.31E-03
9/3/2024	3.32E-02	1.55E-03	2.68E-02	1.41E-03	2.82E-02	1.44E-03	2.87E-02	1.45E-03	3.07E-02	1.50E-03
9/9/2024	1.61E-02	1.36E-03	1.49E-02	1.33E-03	1.30E-02	1.26E-03	1.49E-02	1.33E-03	1.44E-02	1.31E-03
9/16/2024	3.19E-02	1.63E-03	3.07E-02	1.62E-03	3.07E-02	1.61E-03	3.26E-02	1.65E-03	3.50E-02	1.70E-03
9/23/2024	1.90E-02	1.30E-03	1.95E-02	1.39E-03	1.98E-02	1.33E-03	1.87E-02	1.31E-03	2.14E-02	1.39E-03
9/30/2024	1.13E-02	1.05E-03	1.38E-02	1.12E-03	1.38E-02	1.14E-03	1.10E-02	1.05E-03	1.12E-02	1.05E-03
10/7/2024	2.32E-02	1.40E-03	2.22E-02	1.38E-03	2.18E-02	1.37E-03	2.18E-02	1.39E-03	2.08E-02	1.36E-03
10/14/2024	4.24E-02	1.85E-03	5.09E-02	1.97E-03	3.94E-02	1.77E-03	3.69E-02	1.72E-03	3.98E-02	1.75E-03

Weekly Air Monitoring Particulate Filters (pCi/m3)										
	A1		A2		A3		A4		A5 (Control)	
Date	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)
10/21/2024	1.86E-02	1.31E-03	1.80E-02	1.29E-03	1.80E-02	1.29E-03	1.66E-02	1.26E-03	1.75E-02	1.27E-03
10/28/2024	3.35E-02	1.70E-03	3.09E-02	1.63E-03	3.12E-02	1.64E-03	3.39E-02	1.69E-03	3.71E-02	1.76E-03
11/4/2024	2.34E-02	1.46E-03	3.33E-02	1.66E-03	2.41E-02	1.44E-03	2.71E-02	1.52E-03	3.90E-02	1.78E-03
11/11/2024	1.97E-02	1.35E-03	1.98E-02	1.35E-03	1.86E-02	1.32E-03	2.14E-02	1.42E-03	2.35E-02	1.45E-03
11/18/2024	1.63E-02	1.24E-03	1.51E-02	1.21E-03	1.66E-02	1.28E-03	1.63E-02	1.25E-03	1.95E-02	1.33E-03
11/25/2024	2.99E-02	1.57E-03	2.97E-02	1.57E-03	3.22E-02	1.62E-03	2.94E-02	1.56E-03	3.34E-02	1.65E-03
12/2/2024	3.43E-02	1.67E-03	3.05E-02	1.59E-03	3.12E-02	1.60E-03	3.34E-02	1.65E-03	3.27E-02	1.64E-03
12/9/2024	2.73E-02	1.53E-03	2.59E-02	1.48E-03	2.41E-02	1.44E-03	2.87E-02	1.55E-03	2.78E-02	1.53E-03
12/16/2024	2.43E-02	1.44E-03	2.23E-02	1.39E-03	2.42E-02	1.44E-03	2.47E-02	1.45E-03	2.49E-02	1.46E-03
12/23/2024	1.75E-02	1.27E-03	1.48E-02	1.19E-03	1.64E-02	1.23E-03	1.68E-02	1.25E-03	1.66E-02	1.24E-03
12/30/2024	2.14E-02	1.38E-03	2.06E-02	1.38E-03	2.22E-02	1.41E-03	2.09E-02	1.36E-03	2.34E-02	1.43E-03

Table 11 Continued: Weekly Air Monitoring Particulate Filters (pCi/m3)

	SFA1		SFA2 (ISFSI Control)		SFA3		SFA4	
Date	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
1/8/2024	1.55E-02	1.30E-03	1.62E-02	1.29E-03	1.48E-02	1.27E-03	1.63E-02	1.28E-03
1/16/2024	2.51E-02	1.37E-03	2.42E-02	1.33E-03	2.43E-02	1.35E-03	2.33E-02	1.24E-03
1/22/2024	2.44E-02	1.61E-03	2.44E-02	1.58E-03	2.28E-02	1.57E-03	2.42E-02	1.56E-03
1/29/2024	9.89E-03	1.05E-03	1.00E-02	1.01E-03	9.68E-03	1.04E-03	1.06E-02	1.01E-03
2/5/2024	1.43E-02	1.18E-03	1.40E-02	1.18E-03	1.44E-02	1.19E-03	1.57E-02	1.22E-03
2/12/2024	1.77E-02	1.26E-03	1.70E-02	1.24E-03	1.71E-02	1.24E-03	2.33E-02	1.41E-03
2/19/2024	2.03E-02	1.34E-03	2.22E-02	1.40E-03	2.07E-02	1.35E-03	2.38E-02	1.38E-03
2/26/2024	2.29E-02	1.43E-03	2.28E-02	1.42E-03	1.96E-02	1.31E-03	2.68E-02	1.52E-03
3/4/2024	1.94E-02	1.33E-03	1.47E-02	1.17E-03	1.99E-02	1.34E-03	2.50E-02	1.47E-03
3/11/2024	7.18E-03	9.18E-04	7.16E-03	9.19E-04	8.53E-03	9.70E-04	9.79E-03	1.02E-03
3/18/2024	2.74E-02	1.54E-03	2.68E-02	1.52E-03	2.83E-02	1.56E-03	3.28E-02	1.66E-03
3/25/2024	1.53E-02	1.18E-03	1.40E-02	1.14E-03	1.60E-02	1.20E-03	2.00E-02	1.31E-03
4/1/2024	1.98E-02	1.40E-03	1.85E-02	1.29E-03	1.91E-02	1.31E-03	2.25E-02	1.39E-03
4/8/2024	8.03E-03	1.01E-03	8.58E-03	1.01E-03	7.94E-03	9.85E-04	9.18E-03	1.04E-03
4/15/2024	1.69E-02	1.23E-03	1.56E-02	1.19E-03	1.53E-02	1.18E-03	1.79E-02	1.16E-03
4/22/2024	1.47E-02	1.19E-03	1.73E-02	1.27E-03	1.65E-02	1.24E-03	1.78E-02	1.28E-03
4/29/2024	1.77E-02	1.25E-03	1.90E-02	1.29E-03	1.82E-02	1.26E-03	2.27E-02	1.40E-03
5/6/2024	1.47E-02	1.16E-03	1.49E-02	1.19E-03	1.46E-02	1.17E-03	1.65E-02	1.24E-03
5/13/2024	1.05E-02	1.01E-03	1.27E-02	1.13E-03	1.25E-02	1.12E-03	1.35E-02	1.15E-03
5/20/2024	1.02E-02	1.03E-03	1.29E-02	1.13E-03	1.24E-02	1.10E-03	1.30E-02	1.12E-03
5/28/2024	1.58E-02	1.13E-03	1.93E-02	1.22E-03	1.92E-02	1.21E-03	2.02E-02	1.22E-03
6/3/2024	1.73E-02	1.39E-03	1.92E-02	1.46E-03	2.00E-02	1.48E-03	1.98E-02	1.44E-03
6/10/2024	1.67E-02	1.27E-03	1.68E-02	1.27E-03	1.71E-02	1.28E-03	1.72E-02	1.25E-03

Table 11 Continued: Weekly Air Monitoring Particulate Filters (pCi/m3)

	SFA1		SFA2 (ISFSI Control)		SFA3		SFA4	
Date	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
6/17/2024	1.49E-02	1.20E-03	1.78E-02	1.30E-03	1.77E-02	1.28E-03	1.54E-02	1.16E-03
6/24/2024	1.39E-02	1.20E-03	1.46E-02	1.45E-03	1.57E-02	1.25E-03	1.44E-02	1.21E-03
7/1/2024	1.40E-02	1.17E-03	1.55E-02	1.28E-03	1.47E-02	1.19E-03	1.60E-02	1.22E-03
7/8/2024	1.72E-02	1.31E-03	1.82E-02	1.32E-03	2.11E-02	1.40E-03	1.94E-02	1.36E-03
7/15/2024	1.25E-02	1.14E-03	1.47E-02	1.21E-03	1.64E-02	1.26E-03	1.70E-02	1.28E-03
7/22/2024	2.61E-02	1.53E-03	2.94E-02	1.60E-03	2.96E-02	1.61E-03	3.18E-02	1.66E-03
7/29/2024	1.50E-02	1.24E-03	1.78E-02	1.29E-03	1.77E-02	1.29E-03	1.93E-02	1.33E-03
8/5/2024	2.18E-02	1.41E-03	2.34E-02	1.45E-03	2.40E-02	1.47E-03	2.36E-02	1.46E-03
8/12/2024	1.29E-02	1.16E-03	1.48E-02	1.21E-03	1.38E-02	1.18E-03	1.60E-02	1.25E-03
8/19/2024	2.18E-02	1.40E-03	2.48E-02	1.48E-03	2.37E-02	1.44E-03	2.62E-02	1.50E-03
8/26/2024	1.58E-02	1.24E-03	1.67E-02	1.27E-03	1.80E-02	1.30E-03	1.87E-02	1.32E-03
9/3/2024	2.71E-02	1.43E-03	3.01E-02	1.48E-03	3.09E-02	1.50E-03	3.23E-02	1.53E-03
9/9/2024	1.27E-02	1.25E-03	1.36E-02	1.48E-03	1.43E-02	1.31E-03	1.42E-02	1.31E-03
9/16/2024	4.80E-02	2.01E-03	3.14E-02	1.62E-03	3.29E-02	1.65E-03	3.12E-02	1.60E-03
9/23/2024	1.66E-02	1.29E-03	1.78E-02	1.28E-03	1.85E-02	1.29E-03	1.85E-02	1.29E-03
9/30/2024	1.09E-02	1.05E-03	1.13E-02	1.07E-03	1.01E-02	1.01E-03	1.09E-02	1.03E-03
10/7/2024	2.05E-02	1.33E-03	2.06E-02	1.37E-03	2.10E-02	1.35E-03	2.29E-02	1.39E-03
10/14/2024	3.43E-02	1.67E-03	3.33E-02	1.66E-03	3.09E-02	1.60E-03	3.60E-02	1.70E-03
10/21/2024	1.96E-02	1.33E-03	1.77E-02	1.29E-03	1.21E-02	1.12E-03	1.88E-02	1.31E-03
10/28/2024	3.74E-02	1.77E-03	2.94E-02	1.61E-03	3.66E-02	1.77E-03	4.06E-02	1.83E-03
11/4/2024	2.38E-02	1.43E-03	2.24E-02	1.43E-03	2.33E-02	1.45E-03	2.28E-02	1.40E-03
11/11/2024	1.97E-02	1.35E-03	1.90E-02	1.35E-03	1.99E-02	1.36E-03	2.04E-02	1.37E-03
11/18/2024	1.82E-02	1.29E-03	1.77E-02	1.30E-03	1.78E-02	1.28E-03	1.73E-02	1.27E-03

Table 11 Continued: Weekly Air Monitoring Particulate Filters (pCi/m3)

	SFA1		SFA2 (ISFSI Control)		SFA3		SFA4	
Date	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)	Gross Beta Activity	(2-σ)
11/25/2024	3.34E-02	1.70E-03	3.23E-02	1.66E-03	3.13E-02	1.62E-03	2.97E-02	1.57E-03
12/2/2024	3.57E-02	1.70E-03	3.73E-02	1.73E-03	3.56E-02	1.70E-03	3.01E-02	1.58E-03
12/9/2024	3.08E-02	1.58E-03	2.83E-02	1.54E-03	2.89E-02	1.57E-03	2.83E-02	1.54E-03
12/16/2024	2.55E-02	1.47E-03	2.61E-02	1.49E-03	2.45E-02	1.45E-03	2.49E-02	1.46E-03
12/23/2024	1.78E-02	1.27E-03	1.72E-02	1.26E-03	1.71E-02	1.25E-03	1.65E-02	1.24E-03
12/30/2024	2.17E-02	1.37E-03	2.29E-02	1.40E-03	2.06E-02	1.37E-03	2.23E-02	1.40E-03

Table 11 Continued: Weekly Air Monitoring Iodine131 Cartridge Filters (pCi/m3)

Date	A1	A2	A3	A4	A5 (Control)	SFA1	SFA2 [1]	SFA3	SFA4
1/8/2024	*	*	*	*	*	*	*	*	*
1/16/2024	*	*	*	*	*	*	*	*	*
1/22/2024	*	*	*	*	*	*	*	*	*
1/29/2024	*	*	*	*	*	*	*	*	*
2/5/2024	*	*	*	*	*	*	*	*	*
2/12/2024	*	*	*	*	*	*	*	*	*
2/19/2024	*	*	*	*	*	*	*	*	*
2/26/2024	*	*	*	*	*	*	*	*	*
3/4/2024	*	*	*	*	*	*	*	*	*
3/11/2024	*	*	*	*	*	*	*	*	*
3/18/2024	*	*	*	*	*	*	*	*	*
3/25/2024	*	*	*	*	*	*	*	*	*
4/1/2024	*	*	*	*	*	*	*	*	*
4/8/2024	*	*	*	*	*	*	*	*	*
4/15/2024	*	*	*	*	*	*	*	*	*
4/22/2024	*	*	*	*	*	*	*	*	*
4/29/2024	*	*	*	*	*	*	*	*	*
5/6/2024	*	*	*	*	*	*	*	*	*
5/13/2024	*	*	*	*	*	*	*	*	*
5/20/2024	*	*	*	*	*	*	*	*	*
5/28/2024	*	*	*	*	*	*	*	*	*
6/3/2024	*	*	*	*	*	*	*	*	*
6/10/2024	*	*	*	*	*	*	*	*	*
6/17/2024	*	*	*	*	*	*	*	*	*
6/24/2024	*	*	*	*	*	*	*	*	*
7/1/2024	*	*	*	*	*	*	*	*	*
7/8/2024	*	*	*	*	*	*	*	*	*

Table 11 Continued: Weekly Air Monitoring Iodine131 Cartridge Filters (pCi/m3)

Date	A1	A2	A3	A4	A5 (Control)	SFA1	SFA2 [1]	SFA3	SFA4
7/15/2024	*	*	*	*	*	*	*	*	*
7/22/2024	*	*	*	*	*	*	*	*	*
7/29/2024	*	*	*	*	*	*	*	*	*
8/5/2024	*	*	*	*	*	*	*	*	*
8/12/2024	*	*	*	*	*	*	*	*	*
8/19/2024	*	*	*	*	*	*	*	*	*
8/26/2024	*	*	*	*	*	*	*	*	*
9/3/2024	*	*	*	*	*	*	*	*	*
9/9/2024	*	*	*	*	*	*	*	*	*
9/16/2024	*	*	*	*	*	*	*	*	*
9/23/2024	*	*	*	*	*	*	*	*	*
9/30/2024	*	*	*	*	*	*	*	*	*
10/7/2024	*	*	*	*	*	*	*	*	*
10/14/2024	*	*	*	*	*	*	*	*	*
10/21/2024	*	*	*	*	*	*	*	*	*
10/28/2024	*	*	*	*	*	*	*	*	*
11/4/2024	*	*	*	*	*	*	*	*	*
11/11/2024	*	*	*	*	*	*	*	*	*
11/18/2024	*	*	*	*	*	*	*	*	*
11/25/2024	*	*	*	*	*	*	*	*	*
12/2/2024	*	*	*	*	*	*	*	*	*
12/9/2024	*	*	*	*	*	*	*	*	*
12/16/2024	*	*	*	*	*	*	*	*	*
12/23/2024	*	*	*	*	*	*	*	*	*
12/30/2024	*	*	*	*	*	*	*	*	*

*<MDA, Minimum Detectable Activity

[1] Not a required Sample, monitored as supplemental data for continuity of programs.

Table 12: Quarterly isotopic data - Air (pCi/m3), Oysters (pCi/kg), and ISFSI Veg (pCi/kg wet) ISFSI Soil (pCi/kg)

Location	Q1	Q2	Q3	Q4
Quarterly Air Filter Composite for Gamma Emitters (pCi/m^3)				
A1	<MDAs	<MDAs	<MDAs	<MDAs
A2	<MDAs	<MDAs	<MDAs	<MDAs
A3	<MDAs	<MDAs	<MDAs	<MDAs
A4	<MDAs	<MDAs	<MDAs	<MDAs
A5	<MDAs	<MDAs	<MDAs	<MDAs
SFA1	<MDAs	<MDAs	<MDAs	<MDAs
SFA2	<MDAs	<MDAs	<MDAs	<MDAs
SFA3	<MDAs	<MDAs	<MDAs	<MDAs
SFA4	<MDAs	<MDAs	<MDAs	<MDAs
Quarterly Oysters for Gamma Emitters (pCi/kg-wet)				
IA3	<MDA	<MDA	<MDA	<MDA
IA6(Control)	<MDA	<MDA	<MDA	<MDA
Quarterly ISFSI Vegetation for Gamma Emitters (pCi/kg-wet)				
SFB1	<MDA	<MDA	<MDA	<MDA
SFB2	<MDA	<MDA	<MDA	<MDA
SFB3	<MDA	<MDA	<MDA	<MDA
SFB4	<MDA	<MDA	<MDA	<MDA
SFB5	<MDA	<MDA	<MDA	<MDA
Quarterly ISFSI Soil for Gamma Emitters (pCi/kg-dry)				
SFS1	<MDA	<MDA	<MDA	<MDA
SFS2	<MDA	<MDA	<MDA	<MDA
SFS3	<MDA	<MDA	<MDA	<MDA
SFS4	<MDA	<MDA	<MDA	<MDA
SFS5	<MDA	<MDA	<MDA	<MDA

NOTE: <MDA denotes laboratory analysis detected No non-natural radionuclides at or above the ODCM required Minimum Detectable Activity

Table 13: Complete REMP Results, Sediment and Fish

Radionuclides in Sediment (pCi/kg dry)		
Sample Code	Sample Date	Gamma Emitters
WB1	4/15/2024	*
Shoreline at Barge Road	10/21/2024	*
WBS2	6/19/24	*
Bottom Sediment at Discharge Area	10/22/24	*
WBS4	6/19/24	*
Bottom Sediment at Camp Conoy	10/22/24	*

Radionuclides in Fish (pCi/kg-wet)			
Sample Code	Sample Date	Sample Type	Gamma Emitters
IA1	8/14/2024	Spanish Mackerel	*
IA2	8/27/2024	Blue Fish	*
IA4 (Control)	8/14/2024	Blue Fish	*
IA5 (Control)	8/14/2024	Spanish Mackerel	*

* 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 14 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 E1-2 analyzed by CGS and E1-2Q 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 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 laboratory used by CGS for subcontracting and interlaboratory comparison samples, Teledyne Brown Engineering (TBE), also participates 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, [50]. In summary 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.

Table 14: 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

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
4/8/2024	RAD-137 Water	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
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
		pCi/g	Cs-137	0.365	0.451	0.316	0.586	Pass

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
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
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
		pCi	Cr-51	211	195	137	254	Pass
		pCi	Cs-134	137	162	113	211	Pass
		pCi	Cs-137	159	153	107	199	Pass

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
6/13/2024	E14041 Filter	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
		pCi	Cs-137	880	848	696	1110	Pass
		pCi	Co-60	865	839	713	1070	Pass
		pCi	Zn-65	269	239	196	365	Pass

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
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
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

Table 14: 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	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
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
		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

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
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
		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
		pCi/L	Mn-54	109	99.5	69.7	129	Pass
		pCi/L	Zn-65	136	149	104	194	Pass

Table 14: Cross Check Intercomparison Results

Study Date	Study ID	Units	Radionuclide	Reported Value	Assigned Value	Acceptance		Performance Evaluation
						Lower Limit	Upper Limit	
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 14 Continued: 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	Q9-1	1/31/2024	Gross Beta	pCi/L	1.45	0.769	1.97E ± 1.27	Pass
Water	Q9-1	1/31/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/31/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/31/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	2/28/2024	Gross Beta	pCi/L	1.28	0.770	2.5±1.25	Pass
Water	Q9-1	2/28/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	2/28/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	2/28/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	3/27/2024	Gross Beta	pCi/L	1.39	0.722	2.92±1.26	Pass
Water	Q9-1	3/27/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	3/27/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	3/27/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	5/1/2024	Gross Beta	pCi/L	1.42	0.711	2.00±1.3	Pass
Water	Q9-1	5/1/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	Q9-1	5/1/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	5/1/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	5/29/2024	Gross Beta	pCi/L	<MDA		2.79±1.4	Pass
Water	Q9-1	5/29/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	5/29/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	5/29/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	6/26/2024	Gross Beta	pCi/L	1.37	0.753	3.39±1.52	Pass
Water	Q9-1	6/26/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	6/26/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	6/26/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	8/1/2024	Gross Beta	pCi/L	1.52	0.789	<MDA	Pass
Water	Q9-1	8/1/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	8/1/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	8/1/2024	Tritium	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	Q9-1	8/29/2024	Gross Beta	pCi/L	1.93	0.781	3.66±1.43	Pass
Water	Q9-1	8/29/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	8/29/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	8/29/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/3/2024	Gross Beta	pCi/L	1.60	0.762	<MDA	Pass
Water	Q9-1	10/3/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/3/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/3/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/30/2024	Gross Beta	pCi/L	1.97	0.788	2.68±1.62	Pass
Water	Q9-1	10/30/2024	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/30/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	10/30/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	12/4/2024	Gross Beta	pCi/L	1.58	0.768	<MDA	Pass
Water	Q9-1	12/4/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	Q9-1	12/4/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	12/4/2024	Tritium	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/2/2025	Gross Beta	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/2/2025	LLI	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/2/2025	Gamma	pCi/L	<MDA		<MDA	Pass
Water	Q9-1	1/2/2025	Tritium	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	1/18/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	1/18/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	2/14/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	2/14/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	3/7/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	3/7/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	G2-1	3/20/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	3/20/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	4/4/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	4/4/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	4/18/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	4/18/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/1/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/1/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/15/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/15/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/29/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	5/29/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	G2-1	6/13/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	6/13/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	6/26/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	6/26/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	7/10/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	7/10/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	7/24/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	7/24/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	8/8/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	8/8/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	8/22/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	8/22/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	G2-1	9/5/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	9/5/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	9/19/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	9/19/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/3/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/3/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/17/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/17/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/30/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	10/30/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	11/13/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	11/13/2024	LLI	pCi/L	<MDA		<MDA	Pass

Table 14 Continued: 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	G2-1	11/26/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	11/26/2024	LLI	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	12/11/2024	Gamma	pCi/L	<MDA		<MDA	Pass
Milk	G2-1	12/11/2024	LLI	pCi/L	<MDA		<MDA	Pass
Filter Composite	E1-2	3/27/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	E1-2	6/26/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	E1-2	10/3/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	E1-2	1/2/2025	Gamma	pCi/m3	<MDA		<MDA	Pass
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

Table 14 Continued: 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	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

Table 14 Continued: Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
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
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

Table 14 Continued: Interlaboratory Split Sample Results

Sample Type	Location	Sample Date	Analysis	Result Units	CGS Results w 2σ		TBE Split Results w 2σ	Pass/Fail (Split)
Fish (Spanish Mackerel)	IA1	8/14/2024	Gamma	pCi/kg	<MDA		<MDA	Pass
Filter Composite	CC-A1	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-A2	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-A3	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-A4	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-A5	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-SFA1	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-SFA2	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-SFA3	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass
Filter Composite	CC-SFA4	9/30/2024	Gamma	pCi/m3	<MDA		<MDA	Pass

Table 14 Continued: Interlaboratory Split Sample Results (Air Particulate Beta)

Media	Location	Sample Date	Beta	pCi/M^3	(CGS) E1-2	±2σ	(TBE) E1-2Q	±2σ
Filter	E1-2 / E1-2Q	1/04/2024	Beta	pCi/M^3	2.46E-02	2.37E-03	8.99E-03	4.65E-03
Filter	E1-2 / E1-2Q	1/11/2024	Beta	pCi/M^3	1.73E-02	2.05E-03	1.40E-02	3.83E-03
Filter	E1-2 / E1-2Q	1/18/2024	Beta	pCi/M^3	3.39E-02	2.68E-03	2.02E-02	4.34E-03
Filter	E1-2 / E1-2Q	1/25/2024	Beta	pCi/M^3	2.64E-02	2.37E-03	1.61E-02	4.20E-03
Filter	E1-2 / E1-2Q	1/31/2024	Beta	pCi/M^3	1.25E-02	2.06E-03	9.29E-03	4.01E-03
Filter	E1-2 / E1-2Q	2/08/2024	Beta	pCi/M^3	1.83E-02	1.99E-03	1.23E-02	3.41E-03
Filter	E1-2 / E1-2Q	2/14/2024	Beta	pCi/M^3	2.28E-02	2.63E-03	1.23E-02	4.54E-03
Filter	E1-2 / E1-2Q	2/22/2024	Beta	pCi/M^3	2.14E-02	2.04E-03	1.11E-02	3.42E-03
Filter	E1-2 / E1-2Q	2/28/2024	Beta	pCi/M^3	2.37E-02	2.56E-03	1.91E-02	4.75E-03
Filter	E1-2 / E1-2Q	3/07/2024	Beta	pCi/M^3	1.32E-02	1.75E-03	7.60E-03	3.15E-03
Filter	E1-2 / E1-2Q	3/14/2024	Beta	pCi/M^3	1.86E-02	2.21E-03	1.42E-02	4.18E-03
Filter	E1-2 / E1-2Q	3/20/2024	Beta	pCi/M^3	2.06E-02	2.49E-03	1.57E-02	4.26E-03
Filter	E1-2 / E1-2Q	3/27/2024	Beta	pCi/M^3	1.31E-02	1.99E-03	1.16E-02	3.61E-03
Filter	E1-2 / E1-2Q	4/04/2024	Beta	pCi/M^3	1.63E-02	1.89E-03	9.42E-03	3.57E-03
Filter	E1-2 / E1-2Q	4/11/2024	Beta	pCi/M^3	1.61E-02	2.01E-03	8.08E-03	3.54E-03
Filter	E1-2 / E1-2Q	4/18/2024	Beta	pCi/M^3	1.99E-02	2.21E-03	1.01E-02	3.83E-03
Filter	E1-2 / E1-2Q	4/25/2024	Beta	pCi/M^3	1.54E-02	2.04E-03	1.09E-02	3.67E-03
Filter	E1-2 / E1-2Q	5/01/2024	Beta	pCi/M^3	2.45E-02	2.63E-03	1.75E-02	4.61E-03

Table 14 Continued: Interlaboratory Split Sample Results (Air Particulate Beta)

Media	Location	Sample Date	Beta	pCi/M^3	(CGS) E1-2	±2σ	(TBE) E1-2Q	±2σ
Filter	E1-2 / E1-2Q	5/9/2024	Beta	pCi/M^3	1.41E-02	1.70E-03	1.12E-02	3.37E-03
Filter	E1-2 / E1-2Q	5/15/2024	Beta	pCi/M^3	8.08E-03	2.05E-03	8.46E-03	3.71E-03
Filter	E1-2 / E1-2Q	5/23/2024	Beta	pCi/M^3	1.40E-02	1.84E-03	1.16E-02	3.49E-03
Filter	E1-2 / E1-2Q	5/29/2024	Beta	pCi/M^3	1.94E-02	2.38E-03	1.13E-02	4.37E-03
Filter	E1-2 / E1-2Q	6/06/2024	Beta	pCi/M^3	1.87E-02	1.98E-03	1.80E-02	3.94E-03
Filter	E1-2 / E1-2Q	6/13/2024	Beta	pCi/M^3	1.08E-02	1.82E-03	1.02E-02	3.70E-03
Filter	E1-2 / E1-2Q	6/20/2024	Beta	pCi/M^3	2.35E-02	2.41E-03	2.06E-02	4.41E-03
Filter	E1-2 / E1-2Q	6/26/2024	Beta	pCi/M^3	2.63E-02	2.67E-03	1.65E-02	4.74E-03
Filter	E1-2 / E1-2Q	7/03/2024	Beta	pCi/M^3	1.48E-02	1.93E-03	9.09E-03	3.78E-03
Filter	E1-2 / E1-2Q	7/10/2024	Beta	pCi/M^3	2.61E-02	2.43E-03	1.64E-02	4.38E-03
Filter	E1-2 / E1-2Q	7/18/2024	Beta	pCi/M^3	2.29E-02	2.15E-03	1.56E-02	3.79E-03
Filter	E1-2 / E1-2Q	7/24/2024	Beta	pCi/M^3	2.28E-02	2.55E-03	1.21E-02	4.55E-03
Filter	E1-2 / E1-2Q	8/01/2024	Beta	pCi/M^3	2.36E-02	2.15E-03	2.03E-02	4.15E-03
Filter	E1-2 / E1-2Q	8/08/2024	Beta	pCi/M^3	2.62E-02	2.44E-03	1.50E-02	4.32E-03
Filter	E1-2 / E1-2Q	8/15/2024	Beta	pCi/M^3	1.77E-02	2.14E-03	2.14E-02	4.43E-03
Filter	E1-2 / E1-2Q	8/22/2024	Beta	pCi/M^3	1.88E-02	2.21E-03	1.43E-02	4.01E-03
Filter	E1-2 / E1-2Q	8/29/2024	Beta	pCi/M^3	4.12E-02	2.87E-03	2.95E-02	4.85E-03
Filter	E1-2 / E1-2Q	9/05/2024	Beta	pCi/M^3	2.04E-02	2.30E-03	1.30E-02	4.17E-03
Filter	E1-2 / E1-2Q	9/12/2024	Beta	pCi/M^3	2.38E-02	2.37E-03	2.02E-02	4.26E-03

Table 14 Continued: Interlaboratory Split Sample Results (Air Particulate Beta)

Media	Location	Sample Date	Beta	pCi/M^3	(CGS) E1-2	±2σ	(TBE) E1-2Q	±2σ
Filter	E1-2 / E1-2Q	9/19/2024	Beta	pCi/M3	3.26E-02	2.63E-03	2.60E-02	4.61E-03
Filter	E1-2 / E1-2Q	9/26/2024	Beta	pCi/M3	2.24E-02	2.24E-03	2.01E-02	4.39E-03
Filter	E1-2 / E1-2Q	10/03/2024	Beta	pCi/M3	1.13E-02	1.89E-03	8.26E-03	3.65E-03
Filter	E1-2 / E1-2Q	10/10/2024	Beta	pCi/M3	2.69E-02	2.40E-03	2.19E-02	4.66E-03
Filter	E1-2 / E1-2Q	10/17/2024	Beta	pCi/M3	2.76E-02	2.41E-03	1.72E-02	4.17E-03
Filter	E1-2 / E1-2Q	10/24/2024	Beta	pCi/M3	3.73E-02	2.72E-03	3.39E-02	5.17E-03
Filter	E1-2 / E1-2Q	10/30/2024	Beta	pCi/M3	1.96E-02	2.45E-03	1.57E-02	4.58E-03
Filter	E1-2 / E1-2Q	11/07/2024	Beta	pCi/M3	2.42E-02	2.15E-03	2.10E-02	3.89E-03
Filter	E1-2 / E1-2Q	11/13/2024	Beta	pCi/M3	2.03E-02	2.46E-03	1.69E-02	4.76E-03
Filter	E1-2 / E1-2Q	11/20/2024	Beta	pCi/M3	2.63E-02	2.45E-03	2.30E-02	4.50E-03
Filter	E1-2 / E1-2Q	11/26/2024	Beta	pCi/M3	2.04E-02	2.36E-03	1.41E-02	4.52E-03
Filter	E1-2 / E1-2Q	12/04/2024	Beta	pCi/M3	2.38E-02	2.15E-03	2.08E-02	4.08E-03
Filter	E1-2 / E1-2Q	12/11/2024	Beta	pCi/M3	2.87E-02	2.53E-03	2.21E-02	4.54E-03
Filter	E1-2 / E1-2Q	12/19/2024	Beta	pCi/M3	1.89E-02	1.93E-03	1.45E-02	3.56E-03
Filter	E1-2 / E1-2Q	12/26/2024	Beta	pCi/M3	2.01E-02	2.20E-03	1.65E-02	4.20E-03
Filter	E1-2 / E1-2Q	1/2/2025	Beta	pCi/M3	1.69E-02	2.05E-03	1.08E-02	3.80E-03

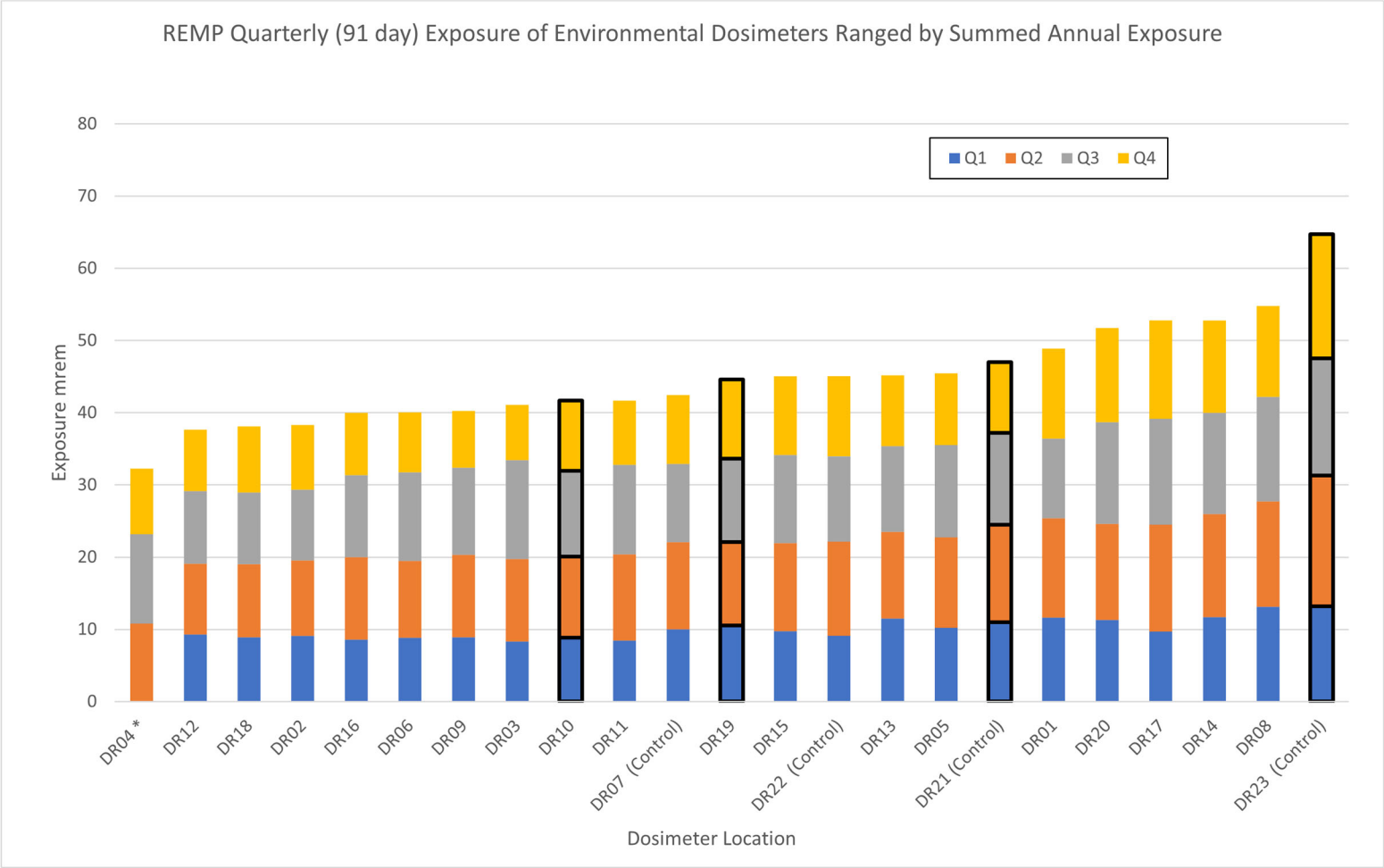
See discussion at the beginning of Attachment 3 describes the interlaboratory split program.

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				
DR01	13.9	23.99	11.6	13.8	11	12.5	ND	ND	ND	ND	52.8	79.8	48.9	ND
DR02	11.5	21.59	9.13	10.4	9.82	8.92	ND	ND	ND	ND	43.6	70.6	38.3	ND
DR03	10.9	20.99	8.31	11.4	13.7	7.68	ND	ND	ND	ND	43.5	70.5	41.1	ND
DR04	13.2	23.29	No data	10.8	12.4	9.09	No data	ND	ND	ND	52.8	79.8	32.3	ND
DR05	13	23.09	10.2	12.5	12.8	9.91	ND	ND	ND	ND	51.8	78.8	45.4	ND
DR06	11	21.09	8.85	10.6	12.3	8.28	ND	ND	ND	ND	44.2	71.2	40	ND
DR07	11.2	21.29	10	12.1	10.8	9.57	ND	ND	ND	ND	44.7	71.7	42.5	ND
DR08	15.8	25.89	13.1	14.6	14.5	12.6	ND	ND	ND	ND	63.3	90.3	54.8	ND
DR09	11.7	21.79	8.91	11.4	12.1	7.85	ND	ND	ND	ND	46.6	73.6	40.3	ND
DR10	11.3	21.39	8.85	11.2	11.9	9.7	ND	ND	ND	ND	42.8	69.8	41.6	ND
DR11	11.5	21.59	8.48	11.9	12.4	8.92	ND	ND	ND	ND	43.6	70.6	41.7	ND
DR12	11.4	21.49	9.29	9.78	10.1	8.45	ND	ND	ND	ND	45.5	72.5	37.6	ND
DR13	12.8	22.89	11.5	12	11.9	9.78	ND	ND	ND	ND	48.6	75.6	45.2	ND
DR14	14.3	24.39	11.7	14.3	14	12.8	ND	ND	ND	ND	57	84.0	52.8	ND
DR15	12.5	22.59	9.72	12.2	12.2	10.9	ND	ND	ND	ND	50	77.0	45	ND
DR16	11.3	21.39	8.58	11.4	11.4	8.58	ND	ND	ND	ND	45	72.0	40	ND
DR17	13.2	23.29	9.67	14.8	14.7	13.6	ND	ND	ND	ND	47.5	74.5	52.8	ND
DR18	10.4	20.49	8.91	10.1	9.92	9.18	ND	ND	ND	ND	41.6	68.6	38.1	ND
DR19	11.7	21.79	10.5	11.6	11.5	11	ND	ND	ND	ND	46.7	73.7	44.6	ND
DR20	14	24.09	11.3	13.3	14.1	13	ND	ND	ND	ND	56.1	83.1	51.7	ND
DR21	13	23.09	11	13.5	12.7	9.78	ND	ND	ND	ND	52.1	79.1	47	ND
DR22	11.9	21.99	9.07	13.1	11.8	11.1	ND	ND	ND	ND	42.9	69.9	45.1	ND
DR23	16.9	26.99	13.2	18.1	16.2	17.2	ND	ND	ND	ND	67.8	94.8	64.7	ND
DR30	13.4	23.49	11.9	11.4	11.6	9.74	ND	ND	ND	ND	53.8	80.8	44.6	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				
SFDR01	18.8	28.89	16.9	17.6	21.3	16.1	ND	ND	ND	ND	75.1	102.1	71.9	ND
SFDR02	20.3	30.39	16	17.5	19.9	17	ND	ND	ND	ND	81.1	108.1	70.4	ND
SFDR03	39.3	49.39	28.1	27.1	29.6	30	ND	ND	ND	ND	157	184.0	115	ND
SFDR04	34.5	44.59	49.3	52.8	61.4	61.7	14.9	18.3	26.9	27.3	138	165.0	225	87.4
SFDR05	20.6	30.69	39.8	44.6	49.6	50.1	19.3	24.1	29.1	29.6	82.2	109.2	184	102
SFDR06	17.5	27.59	29.6	33.3	50.4	60.6	12.1	15.8	32.8	43.1	70.1	97.1	174	104
SFDR07	13.2	23.29	10.7	13.4	13.3	13.9	ND	ND	ND	ND	52.8	79.8	51.3	ND
SFDR08	29.8	39.89	21.7	24.6	25.7	25	ND	ND	ND	ND	119	146.0	97	ND
SFDR09	15.8	25.89	77.5	86.8	142	195	61.7	71	127	179	63.2	90.2	501	438
SFDR10	32.7	42.79	20.6	24	25.4	23.4	ND	ND	ND	ND	131	158.0	93.4	ND
SFDR11	31	41.09	21.9	23.1	23.1	23	ND	ND	ND	ND	124	151.0	91.1	ND
SFDR12	45.5	55.59	39.3	38.3	40.7	38.4	ND	ND	ND	ND	182	209.0	157	ND
SFDR13	23.9	33.99	132	147	145	163	108	123	121	139	95.7	122.7	587	491
SFDR14	18	28.09	98.1	97.1	222	350	80	79.1	204	332	72.1	99.1	767	695
SFDR15	22.7	32.79	45.9	55.7	55.5	56.1	23.2	33	32.8	33.4	90.7	117.7	213	122
SFDR16	37.9	47.99	99	97.5	110	129	61.1	59.6	72.3	91.2	152	179.0	436	284
SFDR17	42.2	52.29	30.6	37.4	41.9	37.5	ND	ND	ND	ND	169	196.0	147	ND
SFDR18	48.5	58.59	37.6	37.8	39	40.7	ND	ND	ND	ND	194	221.0	155	ND

MDD_Q = Quarterly Minimum Differential Dose = 10.09 mrem
MDD_A = Annual Minimum Differential Dose = 27.02 mrem
ND = Not Detected, where $M_Q \leq (B_Q+MDD_Q)$ or $M_A \leq (B_A+MDD_A)$



*DR04 Lost Dosimeter in Quarter 1 2024

Figure 7: REMP Quarterly (91 day) Exposure of Environmental Dosimeters

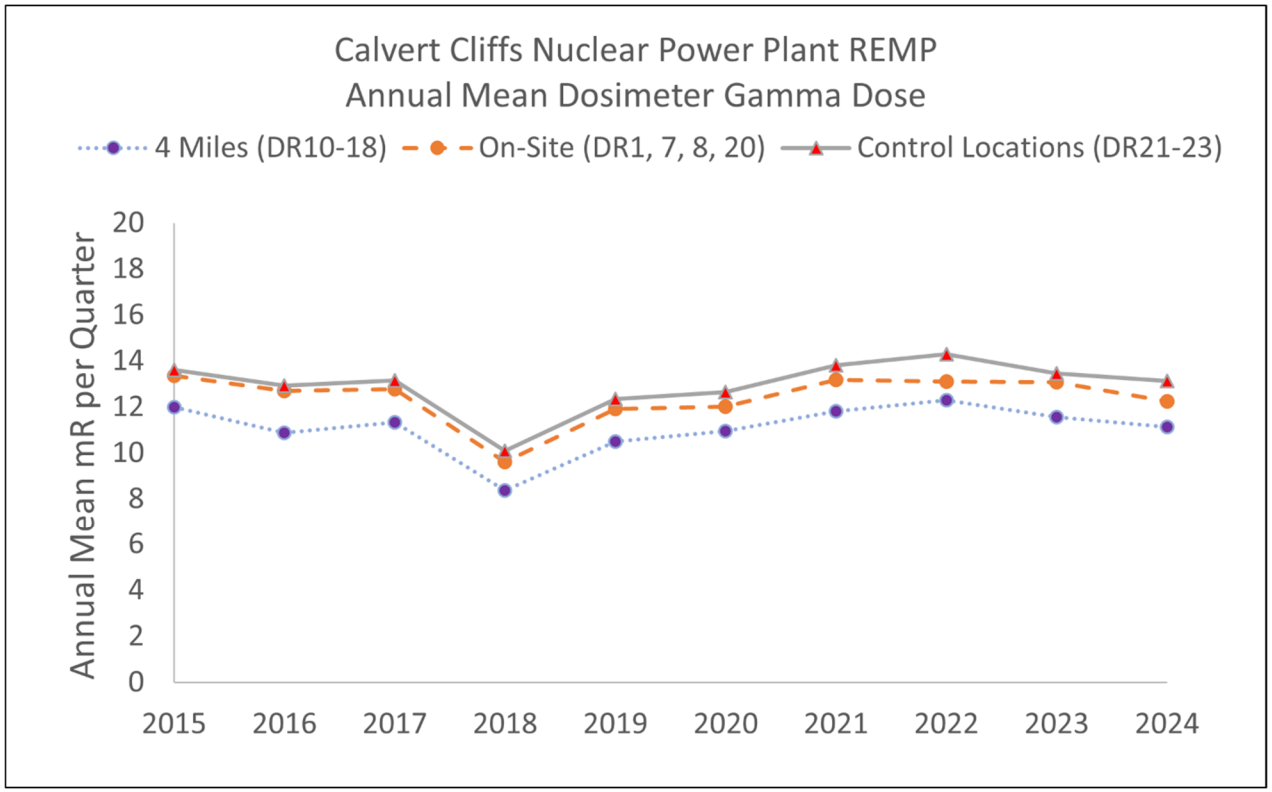


Figure 8: REMP Mean Dosimeter Gamma Dose 10 Year History

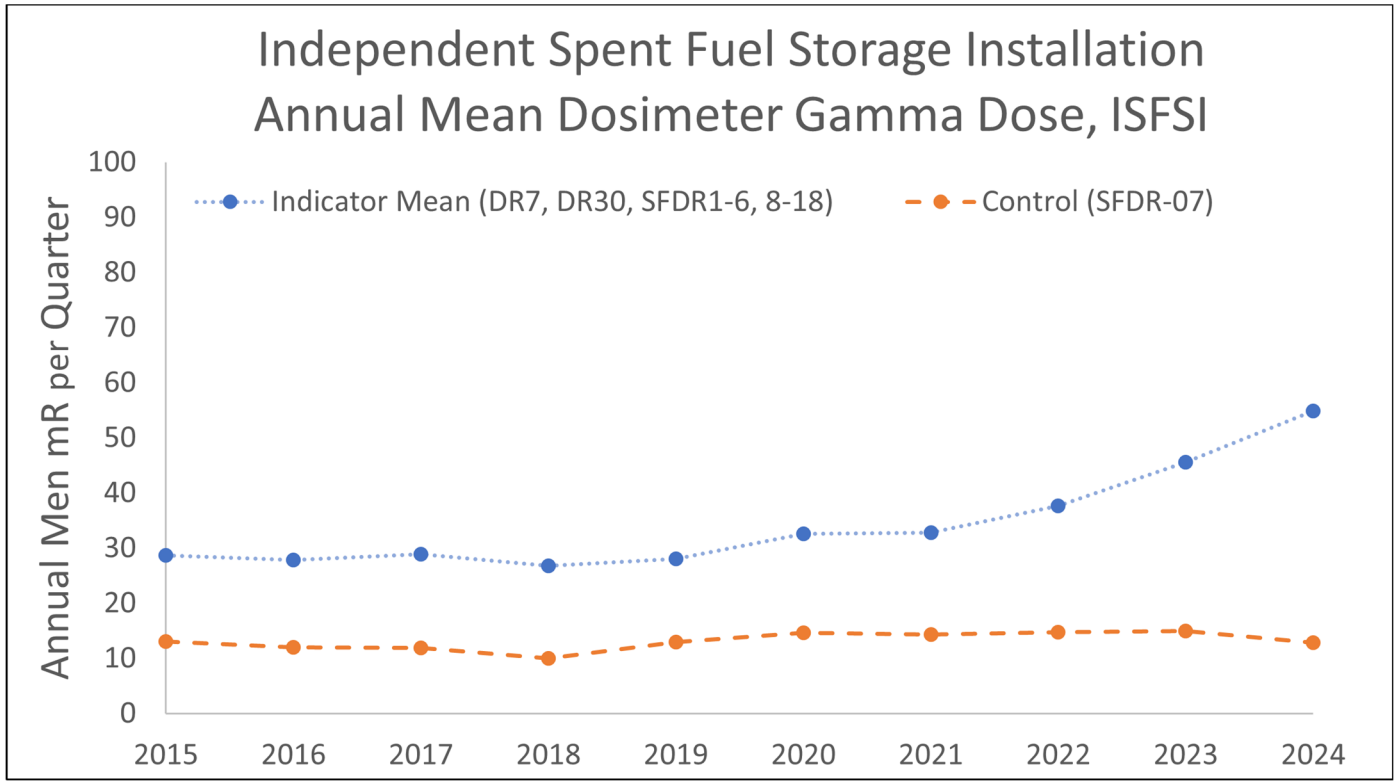


Figure 9: ISFSI Mean Dosimeter Gamma Dose 10 Year History

1.0 Summary and Conclusions

The NEI Industry Groundwater Protection Initiative was established to determine the potential impact nuclear power plants may have on the surrounding environment due to unplanned releases of radioactive liquids. Under the Groundwater Protection Initiative, groundwater monitoring is accomplished through routine sampling of the water table around the plant [23]. Analysis is performed for gamma, tritium, alpha, beta, and various other radiological isotopes. Tables 15 through 19 contain the analytical results for samples taken from the various groundwater monitoring wells, subsurface drains, and rainwater. In 2019 MH24 was renamed to MH66/SSD3.

Calvert Cliffs Generating Station has a total of 16 on-site piezometer tube wells (four Background designated wells, eight Source designated wells, and four Perimeter designated wells), one sub-surface drain, and two circulating water tunnel access manholes (monitored as a Source designated sample locations) that are sampled as part of their RGPP (EN-CA-408-4160). Figure 10 shows the manhole and monitoring well sample locations.

Groundwater samples were collected from 16 on-site piezometer tubes and three subsurface manholes in 2024. These locations are listed in Table 20 and on Figure 10, Site Map Groundwater Monitoring Wells. Figure 11, Site Map Precipitation Recapture Locations shows precipitation collection sites. Based on recapture tritium results, groundwater at the station could potentially be affected by precipitation recapture.

A piezometer tube is a shallow monitoring well which allows access to groundwater at a depth of approximately 40 feet beneath the site. Of the piezometer tubes sampled, only MH28 and MH30 showed any plant related results greater than MDAs. This activity was previously identified and evaluated in December of 2005. The activity consists of tritium originating from normal radiological waste discharges and was previously reported in the Annual Radioactive Release Reports. The tritium contamination is contained on site. No drinking water has been affected; the groundwater at this location does not impact any drinking water pathway.

The 2024 RGPP sample locations effectively monitored Systems, Structures, and Components of the Station. Therefore, RGPP sample locations identified in Attachment 1 of EN-CA-408-4160 should continue to be sampled in accordance with Attachment 2 of EN-CA-408-4160.

Table 15: Alpha Isotopic and Pu-241 in Groundwater (pCi/L)

Location	Date	Fe-55	Ni-63	Cm-242	Cm-243 / Cm-244	Pu-238	Pu-239 / Pu-240	U-233 / U-234	U-238
PZ-11	Oct	<58.08	<3.98	<0.1256	<0.1256	<0.1264	<0.1264	<0.02891	<0.1319

Table 16: Gross Alpha and Strontium Monitoring Results (pCi/L)

Location	Date	Gross Alpha Dissolved	Gross Alpha Suspended	Sr89	Sr90	Units
MH-66	10/15/2024	<1.68	<0.856	<9.31	<0.96	pCi/L
MH-28	10/8/2024	<1.04	<0.856	<9.23	<0.983	pCi/L
PZ11	5/7/2024	ND	ND	<9.9	<0.299	pCi/L
PZ11	10/29/2024	<1.43	<0.689	ND	ND	pCi/L
PZ12	5/7/2024	<1.23	<1.05	<6.06	<0.946	pCi/L
PZ13	5/7/2024	<1.22	<1.04	<6.97	<0.962	pCi/L
PZ15	5/7/2024	<1.31	<1.03	<4.12	<0.873	pCi/L
PZ24	5/7/2024	<1.22	<1.29	<5.06	<0.856	pCi/L
PZ25	7/29/2025	<1.77	<0.88	<2.37	<0.832	pCi/L
PZ29	5/7/2024	1.22	2.27	<4.69	<0.951	pCi/L
PZ30	5/7/2024	4.13	<1.08	<4.15	<0.799	pCi/L

ND No Data, sample obtained as required.

Table 17: Annual Well Monitoring Gamma Emitters (pCi/L)

Location	5/6/24	5/7/24	5/28/24	7/29/24	10/8/24	10/15/24	10/29/24
MH-66	ND	ND	ND	ND	ND	<MDA	ND
MH-28	ND	ND	ND	ND	<MDA**	ND	ND
PZ11	ND	ND	ND	ND	ND	ND	<MDA**
PZ12	ND	<MDA	ND	ND	ND	ND	ND
PZ13	ND	<MDA	ND	ND	ND	ND	ND
PZ15	ND	<MDA	ND	ND	ND	ND	ND
PZ19	<MDA	ND	ND	ND	ND	ND	ND
PZ20	<MDA	ND	ND	ND	ND	ND	ND
PZ21	<MDA	ND	ND	ND	ND	ND	ND
PZ22	<MDA	ND	ND	ND	ND	ND	ND
PZ23	ND	<MDA	ND	ND	ND	ND	ND
PZ24	ND	<MDA	ND	ND	ND	ND	ND
PZ25	ND	ND	<MDA	<MDA	ND	ND	ND
PZ26	<MDA	ND	ND	ND	ND	ND	ND
PZ27	<MDA	ND	ND	ND	ND	ND	ND
PZ28	ND	<MDA	ND	ND	ND	ND	ND
PZ29	ND	<MDA	ND	ND	ND	ND	ND
PZ30	ND	<MDA	ND	ND	ND	ND	ND

ND No Data, Sample obtained as required.
<MDA Non-Natural Gamma Emitters below MDA
**Short lived isotopes Ba-140 and I-131 were not detected above MDA. MDAs are elevated due to samples held in the laboratory and analyzed on site.

Table 18: Quarterly Monitoring Tritium (pCi/L)

Location	Qtr1	Qtr2	Qtr3	Qtr4
MH-66	<200	<200	<200	<200
MH-28	848	330	<1000	1640
MH-30	994	656	<1000	305
PZ11	<200	<200	<200	<200
PZ12	<200	<200	<200	<200
PZ13	<200	<200	<200	<200
PZ15	<200	<200	<200	<200
PZ24	<200	<200	<200	<200
PZ25	<200	<200	<200	<200
PZ29	<200	<200	<200	<200
PZ30	<200	<200	<200	<200

Table 18 Continued: Annual Well Monitoring Tritium (pCi/L)

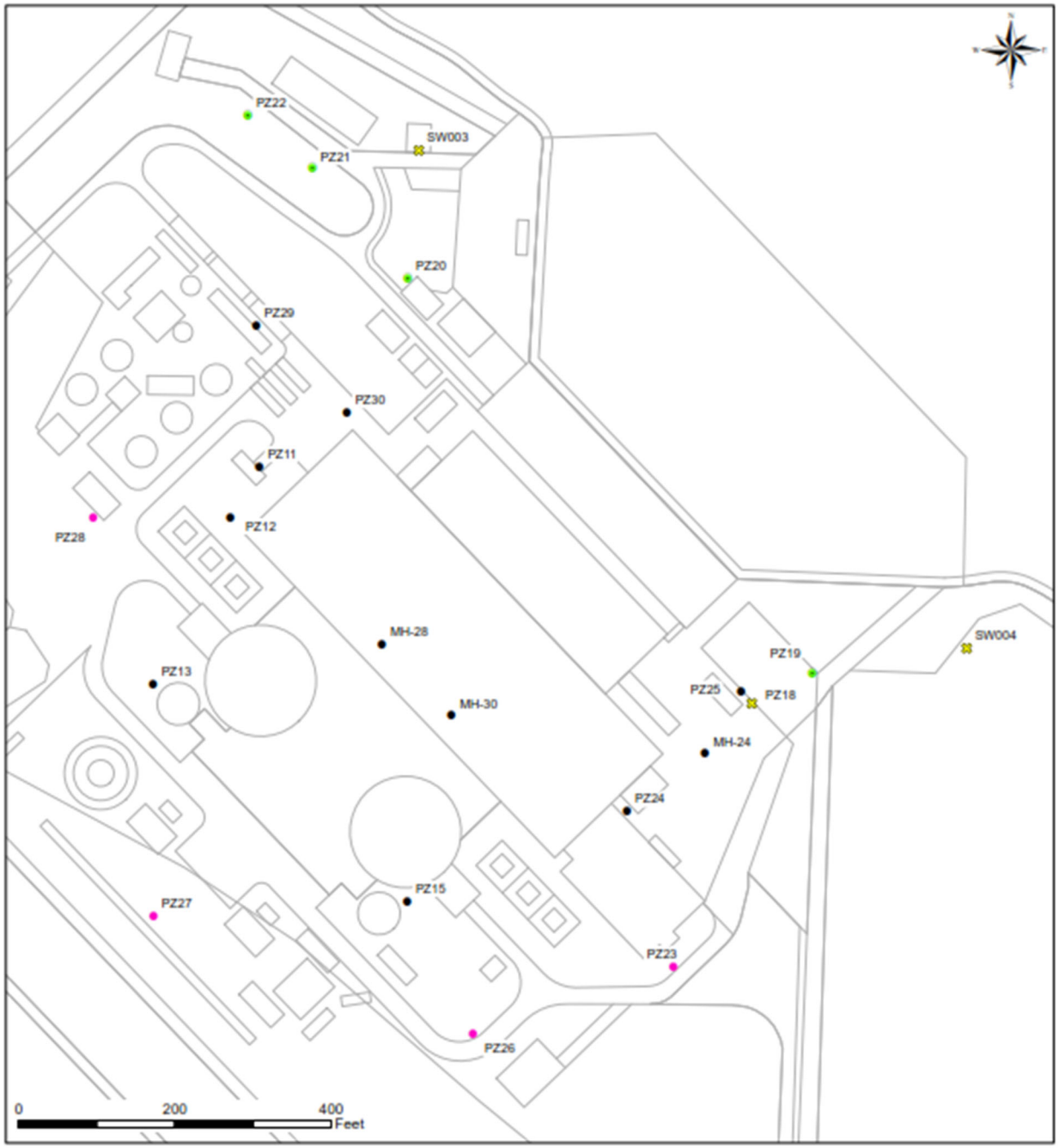
Location	Qtr2	Location	Qtr2
PZ19	<200	PZ23	<200
PZ20	<200	PZ26	<200
PZ21	<200	PZ27	<200
PZ22	<200	PZ28	<200

Table 19: Quarterly Precipitation Monitoring Tritium (pCi/L)

Location	1/23/2024	4/1/2024	7/1/2024	10/1/2024
RW 1	714	<200	213	<200
RW 2	1440	224	<200	<200
RW 3	1400	<200	<200	<200
RW 4	267	<200	197	<200
RW 5	<200	<200	<200	<200
RW 6	<200	<200	<200	<200
RW 7	<200	<200	225	<200
RW 8	<200	<200	<200	<200

Table 20: Locations of Radiological Groundwater Environmental Sampling Stations

RGPP Station	Description
PZ11	45' - North side of Unit 1 near roll-up door
PZ12	NW corner of Unit 1
PZ13	Unit 1 RWT
PZ15	Unit 2 RWT
PZ18	45' - South side near stairwell to waterfront (idle)
PZ19	10' - Southside near traveling screen trough
PZ20	10' -Northside of MMD Shop
PZ21	10' - In grass West of STP
PZ22	10’ - In grass West of STP
PZ23	45’ – S of SSB doors
PZ24	45' - East of SSB near Unit 2 roll-up door
PZ25	45' - South side near stairwell to waterfront
PZ26	45' -SW of Spare Transformer
PZ27	45' -SW of Spare Transformer
PZ28	45’ – SW corner of NRC Bldg
PZ29	45' - East of Nitrogen Tank in road
PZ30	45' -NE Corner of Turbine Bldg
RW1	Met Tower
RW2	Lower Lay Down Area
RW3	Visitor’s Center Overlook
RW4	Waterfront
RW5	Open Grass Area outside NSF PA exit
RW6	U2 Turbine Building roll up door
RW7	Open area north of Outfall 004
RW8	Open area on north wing wall
MH28	12'- Unit1 next to Feed Water Heater
MH30	12'- Unit 2 next to elevator
MH66/SSD3	45'- East of SSB and South of Turbine Bldg (formerly named MH-24)
SW003	Waterfront south of Sewage Treatment Plant
SW004	Waterfront Barge Dock Rd



Explanation:
Modified RGPP Sample Locations

- Background
- Perimeter
- Source
- Idle

Figure 1
RGPP Sample Locations
Overburden Aquifer
Constellation Energy Corporation
Calvert Cliffs Generating Station

Figure 10: Site Map Groundwater Monitoring Wells

Figure 11: Site Map Precipitation Recapture Locations