John Twarog
Manager
Regulatory Assurance
504-739-6747

W3F1-2025-0013

April 30, 2025

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Annual Radiological Environmental Operating Report (AREOR) – 2024

Waterford Steam Electric Station, Unit 3
Docket No. 50-382
Renewed Facility Operating License No. NPF-38

Attached is the Annual Radiological Environmental Operating Report for the period of January 1 through December 31, 2024. This report is submitted pursuant to the requirements of Waterford 3 Technical Specification Section 6.9.1.7.

There are no commitments contained in this submittal.

If you have any questions, please contact John Twarog, Regulatory Assurance Manager, at 504-739-6747.

Respectfully,

John R. Twarog

Digitally signed by John R. Twarog
DN: cn=John R. Twarog, o=Entergy, ou=Waterford 3 Regulatory Assurance, email=jtwarog@entergy.com
Date: 2025.04.29 15:11:19 -05'00'

John Twarog

JT/llb

Enclosure: Annual Radiological Environmental Operating Report – 2024

cc: NRC Region IV Regional Administrator
NRC Senior Resident Inspector – Waterford Steam Electric Station, Unit 3
NRC Project Manager – Waterford Steam Electric Station, Unit 3
Entergy Legal, General Sr Counsel

Enclosure to

W3F1-2025-0013

Annual Radiological Environmental Operating Report – 2024

(56) pages follow)

2024 Annual Radiological Environmental Operating Report
Waterford 3
Document Number: 50-382

Author: Kimberly Thurman Date: 04/23/2025

Kimberly Thurman
Teledyne Brown Engineering Project Manager

Author: Michelle Moore Digitally signed by Michelle Moore DN: cn=Michelle Moore, o=Entergy, email=mbeaver@entergy.com Date: 2025.04.24 15:04:43 -05'00' Date: 4/24/25

Michelle Moore
Effluent/REMP Specialist

Reviewer: Bill Spell Date: 4/23/25

Bill Spell
Radiological Solutions Consultant

Reviewer: Terry E. Parrill Digitally signed by Terry E. Parrill DN: cn=Terry E. Parrill, o=Entergy/Waterford 3 S.E.S., ou=WF3 Chemistry, email=tparril@entergy.com Date: 2025.04.24 17:42:13 -05'00' Date: 4/24/25

Terry Parrill
Chemistry Supervisor

Approver: Melody Gibson Digitally signed by Melody Gibson DN: cn=Melody Gibson , o=Entergy, ou=Fleet Radiation Protection, email=mgibson@entergy.com Date: 2025.04.24 17:54:58 -05'00' Date: 4/24/25

Melody Gibson
Chemistry/Radiation Protection Manager

entergy

Waterford 3

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Annual Radiological Environmental Operating Report

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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. 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.

15. 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.

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

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

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

19. N/A: Not Applicable

20. NEI: Nuclear Energy Institute

21. NIST: National Institute of Standards and Technology.

22. NRC: Nuclear Regulatory Commission

23. ODCM: Offsite Dose Calculation Manual

24. OSLD: Optically Stimulated Luminescence Dosimeter

25. pCi/L: picocuries / Liter

26. PWR: Pressurized Water Reactor

27. WF3: Waterford 3

28. REMP: Radiological Environmental Monitoring Program

29. TLD: Thermoluminescent Dosimeter

2.0 EXECUTIVE SUMMARY

Waterford 3 (WF3) Radiological Environmental Monitoring Program (REMP) was established prior to the station becoming operational to provide information on background radiation present in the area. The goal of WF3 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 WF3 Technical Specifications, Section 6.9.1.7. 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 WF3 for the reporting period of January 1st through December 31st, 2024. During that time period 508 analyses were performed on 450 samples. In assessing all the data gathered for this report and comparing these results with preoperational data and/or 10-year average values, it was concluded that the operation of WF3, did not result in detection of plant related radionuclides in the environment.

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 WF3. 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].

All required lower limit of detection (LLD) capabilities were achieved in all sample analyses during 2024, as required by the WF3 Technical Requirement Manual (TRM) Table 4.12-1. No measurable levels of radiation above baseline levels attributable to WF3 operation were detected in the vicinity of WF3. The 2024 Radiological Environmental Monitoring Program thus substantiated the adequacy of source control and effluent monitoring at WF3 with no observed impact of plant operations on the environment.

In 2024, environmental samples were collected for radiological analysis. The results of indicator locations were compared with control locations and previous studies. It was concluded that no significant relationship exists between WF3 operation and effect on the area around the plant. The review of 2024 data showed radioactivity levels in the environment were undetectable in many locations and near background levels in significant pathways.

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].

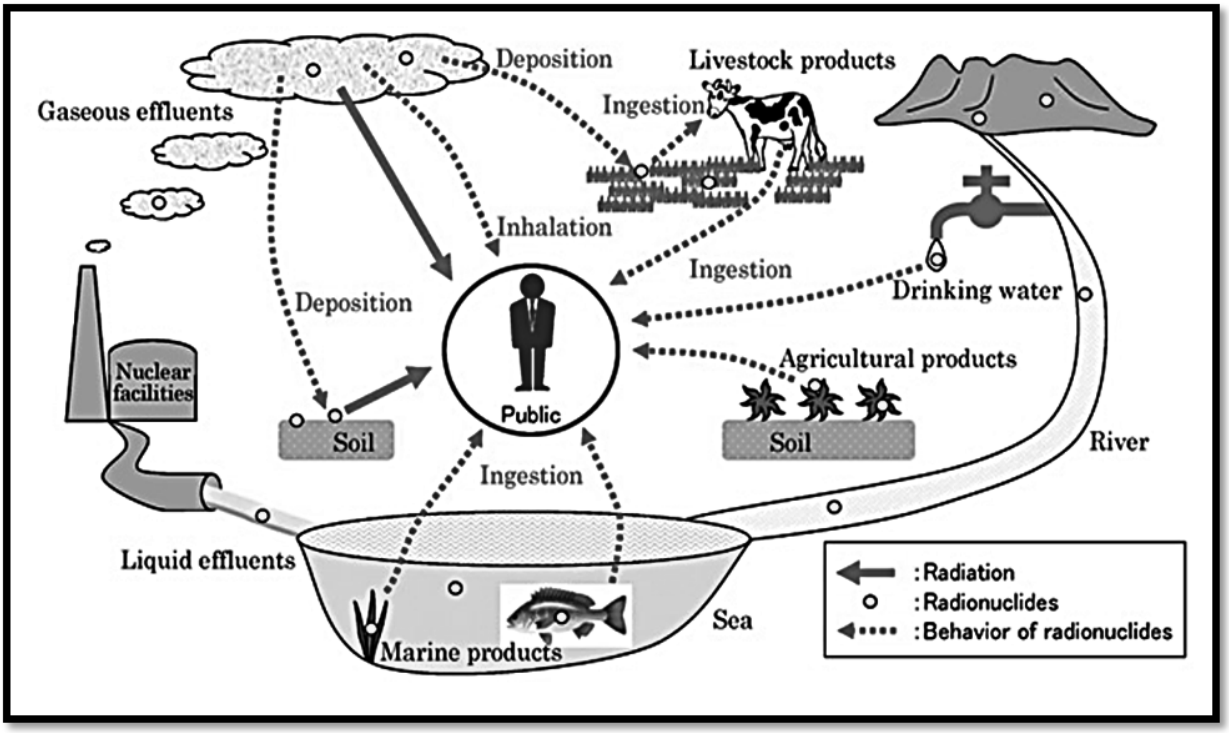

Figure 1, Potential exposure pathways to Members of the Public due to Plant Operations [7]

Quality assurance aspects of the sampling program and TLD/OSLD data collection are conducted in accordance with Regulatory Guides 4.15 [8] and 4.13 [9]. REMP also adheres to the requirements of Louisiana, WF3 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

Waterford 3 is a commercial nuclear power plant that achieved initial criticality in 1985. Waterford 3 is located on a 3,560-acre site in Killona, Louisiana in St. Charles Parish, approximately 25 miles west of New Orleans, Louisiana. The REMP includes sampling indicator and control locations within an approximate 20-mile radius of the plant.

Waterford 3 sampling media are selected based on site specific information such as meteorology, receptor locations, and water usage around the plant. Sampling and analysis frequencies are documented in the Offsite Dose Calculation Manual and site procedures. Required sampling, analysis frequencies and location of sample collected are captured in the following tables and figures:

- Table 1, Radiological Environmental Monitoring Program – Direct Radiation
- Table 2, Radiological Environmental Monitoring Program – Airborne
- Table 3, Radiological Environmental Monitoring Program – Waterborne
- Table 4, Radiological Environmental Monitoring Program – Ingestion
- Table 5, REMP Direct Radiation Sampling Locations
- Figure 2, REMP Sample Locations (Within 2 Miles of Waterford 3)
- Figure 3, REMP Sample Locations (Within 2 to 10 Miles of Waterford 3
- Figure 4, REMP Sample Locations (Within 10 to 50 Miles of Waterford 3)

5.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REQUIREMENTS

Table 1, Radiological Environmental Monitoring Program – Direct Radiation

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Direct Radiation An inner ring of stations, one in each meteorological sector in the general area of the SITE BOUNDARY. An outer ring of stations, one in ten of the meteorological sectors in the 6 to 8 km ranges from the site. The balance of the stations (five) to be placed in special interest areas such as population centers, nearby residences, schools, and in one or two areas to serve as control locations.	See Table 5, REMP	Quarterly	Gamma dose quarterly.

Table 2, Radiological Environmental Monitoring Program – Airborne

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
Airborne Radioiodine and Particulates Three samples from close to the three SITE BOUNDARY locations, in different sectors, in or near sectors having the highest calculated annual average ground-level D/Q.	**APQ-1 (NW, 0.81 Miles)** – (West bank) Located in soybean/sugarcane field off LA 18 east of LA 18/3141 intersection. **APF-1 (ESE, 0.35 Miles)** – (West bank) Located on north side of Secondary Meteorological Tower. **APC-1 (NE, 0.67 Miles)** – (East bank) Located inside Little Gypsy Cooling Water Intake Structure fence.	Continuous sampler operation with sample collection biweekly, or more frequently if required by dust loading.	• Radioiodine Canisters – I-131 analysis biweekly. • Air Particulate – Gross beta radioactivity analysis following filter change. Gamma isotopic analysis of composite (by location) quarterly.
Airborne Radioiodine and Particulates One sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	**APP-1 (WNW, 0.84 Miles)** – (West bank) Located in soybean/sugarcane field on Short St. in Killona.	Continuous sampler operation with sample collection biweekly, or more frequently if required by dust loading.	• Radioiodine Canisters – I-131 analysis biweekly. • Air Particulate – Gross beta radioactivity analysis following filter change. Gamma isotopic analysis of composite (by location) quarterly.
Airborne Radioiodine and Particulates One sample from a control location, as for example 15 - 30 km distance and in the least prevalent wind direction.	**APE-26 (E, 25.8 Miles)** – (West bank) Located at Entergy office on Virgil Street in Gretna. (Control)	Continuous sampler operation with sample collection biweekly, or more frequently if required by dust loading.	• Radioiodine Canisters – I-131 analysis biweekly. • Air Particulate – Gross beta radioactivity analysis following filter change. Gamma isotopic analysis of composite (by location) quarterly.

Table 3, Radiological Environmental Monitoring Program – Waterborne

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
SURFACE WATER One sample upstream and one sample downstream.	**SWP-7 (WNW, 7.37 Miles)** - (West bank) Located at St. John Parish Waterworks in Edgard. (Control) **SWF-2 (ESE, 1.51 Miles)** - (West bank) Located at Dow Chemical Plant drinking water canal. **SWE-5 (E, 4.59 Miles)** - (East bank) Located at St. Charles Parish Waterworks in New Sarpy. **SWK-1 (SSW, 0.49 Miles)** - (West bank) Located at 40 Arpent Canal south of the plant.	Composite sample over one quarter period.	Gamma isotopic analysis and tritium analysis quarterly.
DRINKING WATER One sample upstream and one sample downstream.	**DWP-7 (WNW, 7.37 Miles)** - (West bank) Located at St. John Parish Waterworks in Edgard. (Control) **DWF-2 (ESE, 1.51 Miles)** - (West bank) Located at Dow Chemical Plant drinking water canal. **DWE-5 (E, 4.59 Miles)** - (East bank) Located at St. Charles Parish Waterworks in New Sarpy.	Composite sample over one month period when I-131 analysis is performed, quarterly composite otherwise.	I-131 analysis on each composite when the dose calculated for the consumption of the water is greater than one mrem per year. Composite for gross beta and gamma isotopic analyses quarterly. Composite for tritium analysis quarterly.
SEDIMENT FROM SHORELINE One sample upstream and one sample downstream.	**SHWQ-6 (NW, 5.99 Miles)** – (East bank) Located on LA 628 east of Reserve ferry landing. (Control) **SHWE-3 (E, 2.99 Miles)** – (West bank) Located at Foot Ferry landing on LA 18. **SHWK-1 (SSW, 0.49 Miles)** – (West bank) Located at 40 Arpent Canal south of plant.	Annually	Gamma isotopic analysis annually.

Table 4, Radiological Environmental Monitoring Program – Ingestion

Requirement	Sample Location Description, Distance, and Direction	Sampling Collection/ Frequency	Type and Frequency of Analyses
MILK Samples from milking animals in the three locations within 5 km distance having the highest dose potential. If there are none, then, one sample from milking animals in each of the three areas between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per year. One sample from milking animals at a control location 15 – 30 km distant and in the least prevalent wind direction.	**MKE-3 (E, 2.35 Miles)** - (West bank) Located at the Zeringue's house on LA 18 in Taft. **MKA-31 (N, 31.2 Miles)** – (East bank) Located at 18736 Sisters Road, Ponchatoula, LA. (Control)	Quarterly (When Available).	Gamma isotopic and I-131 analysis quarterly.
FISH AND INVERTEBRATES One sample of a commercially and/or recreationally important species in vicinity of plant discharge area. One sample of similar species in area not influenced by plant discharge.	**FH-2 (Distance/Direction Not Applicable)** – Downstream of the plant discharge structure. **FH-3 (Distance/Direction Not Applicable)** - (Westbank) Waterways downstream of plant discharge directed to 40 Arpent Canal. **FH-1 (Distance/Direction Not Applicable)** – Upstream of the plant intake structure. (Control)	Sample in season, or annually if they are not seasonal.	Gamma isotopic analysis on edible portions annually.
BROAD LEAF VEGETATION Samples of one to three different types of broad leaf vegetation grown nearest each of the two different off-site locations of highest predicted annual average ground level D/Q if milk sampling is not performed. One sample of each of the similar broad leaf vegetation grown 15 – 30 km distant in the least prevalent wind direction if milk sampling is not performed.	**BLQ-1 (NW, 0.83 Miles)** – (West bank) Located near air sample station APQ-1. **BLB-1 (NNE, 0.81 Miles)** – (East bank) Located west of Little Gypsy on LA 628 **BLE-20 (E, 19.7 Miles)** – (West bank) Located on property of Nine Mile Point in Westwego. (Control)	Quarterly during the growing season.	Gamma isotopic and I-131 analysis quarterly.

Table 5, REMP Direct Radiation Sampling Locations

Site #	Location Type	Sector	Distance	Description
A-2	Inner	N	1.27 miles	(East bank) Located on pole on LA 628 at Zephrin L. Perriloux Fire House.
B-1	Inner	NNE	0.75 miles	(East bank) Located on fence west of Little Gypsy.
C-1	Inner	NE	0.67 miles	(East bank) Located on fence at Little Gypsy Cooling Water Intake structure.
D-2	Inner	ENE	1.24 miles	(East bank) Located on pole on levee at west entrance to Bonnet Carre Spillway.
E-1	Inner	E	0.41 miles	(West bank) Located on pole on LA 18 east of Waterford 3 plant entrance.
F-2	Inner	ESE	1.15 miles	(West bank) Located on fence on LA 3142 south of LA 18.
G-2	Inner	SE	1.26 miles	(West bank) Located on fence on LA 3142 north of railroad overpass.
H-2	Inner	SSE	1.54 miles	(West bank) Located on fence on LA 3142 north of LA 3127/3142 intersection.
J-2	Inner	S	1.38 miles	(West bank) Located on fence south of LA 3127 west of LA 3127/3142 intersection.
K-1	Inner	SSW	1.06 miles	(West bank) Located on stop sign at entrance to Entergy Education Center on LA 3127.
L-1	Inner	SW	1.06 miles	(West bank) Located on gate on LA 3127 west of LA 3127/3142 intersection.
M-1	Inner	WSW	0.76 miles	(West bank) Located on south gate of Waterford 1 and 2.
N-1	Inner	W	0.98 miles	(West bank) Located on pole at corner of Railroad Avenue and School House Road.
P-1	Inner	WNW	0.84 miles	(West bank) Located on fence enclosing air sample station APP-1.
Q-1	Inner	NW	0.81 miles	(West bank) Located on fence enclosing air sample station APQ-1.
R-1	Inner	NNW	0.51 miles	(West bank) Located at Waterford 1 and 2 Cooling Water Intake Structure.
A-5	Outer	N	4.59 miles	(East bank) Located on pole at intersection of Oswald Avenue and US 61.

Table 5, REMP Direct Radiation Sampling Locations

Site #	Location Type	Sector	Distance	Description
B-4	Outer	NNE	3.75 miles	(East bank) Located on pole near weigh station on US 61.
D-5	Outer	ENE	4.09 miles	(East bank) Located on gate on shell road north of US 61/LA 48 intersection.
E-5	Outer	E	3.90 miles	(East bank) Located on fence on Wesco Street off LA 48.
F-4	Outer	ESE	3.53 miles	(West bank) Located on pole behind house at 646 Aquarius St. in Hahnville.
G-4	Outer	SE	3.30 miles	(West bank) Located on pole on LA 3160 north of railroad track.
H-8	Outer	SSE	8.13 miles	(West bank) Located on pole in front of Hahnville High School.
P-6	Outer	WNW	5.58 miles	(West bank) Located on fence at LA 640/railroad track intersection.
Q-5	Outer	NW	5.01 miles	(West bank) Located on pole on LA 18 across from Mississippi River marker 137.
R-6	Outer	NNW	5.52 miles	(East bank) Located on fence on LA 3223 near railroad crossing.
E-15	Special Interest	E	11.7 miles	(East bank) Located on fence on Alliance Avenue.
F-9	Special Interest	ESE	8.18 miles	(East bank) Located on fence north of railroad tracks on Jonathan Street.
G-8	Special Interest	SE	7.74 miles	(West bank) Located on back fence of Luling Entergy Office.
J-15	Special Interest	S	11.7 miles	(West bank) Located on pole near LA 631/Hwy 90 intersection in Des Allemands.
E-26	Control	E	25.8 miles	(West bank) Located at Entergy office on Virgil Street in Gretna. (Control)

6.0 MAPS OF COLLECTION SITES

Figure 2, REMP Sample Locations (Within 2 Miles of Waterford 3)

Figure 3, REMP Sample Locations (Within 2 to 10 Miles of Waterford 3)

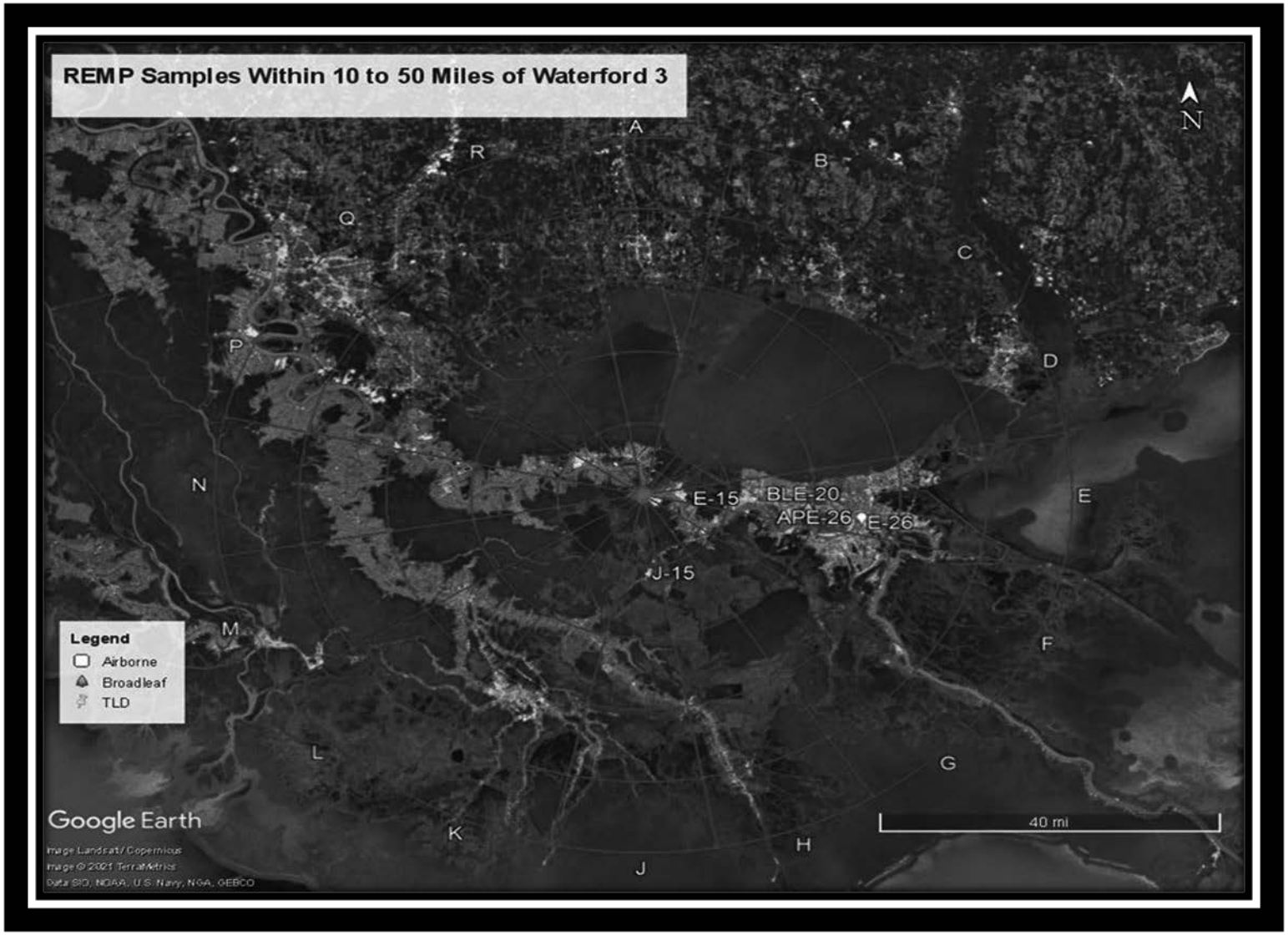

Figure 4, REMP Sample Locations (Within 10 to 50 Miles of Waterford 3)

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		
Nb-95	400				
Zr-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-140	200			300	
La-140	200			300	

Table 7, Maximum Values for the Limit of Detection

Radionuclide	Water (pCi/L)	Air Particulates or Gases (pCi/m^3)	Fish (pCi/Kg-wet)	Milk (pCi/L)	Food Products (pCi/Kg-wet)	Sediment (pCi/Kg-dry)
Gross Beta	4	0.01				
H-3	2,000 (3)					
Mn-54	15		130			
Fe-59	30		260			
Co-58, Co-60	15		130			
Zn-65	30		260			
Nb-95	15					
Zr-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-140	15			15		
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 [15] 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, sediment, fish and vegetation analyzed as part of REMP in 2024 will be discussed. Sampling program descriptions and deviations will also be discussed.

8.1 Environmental Direct Radiation Dosimetry Results

Dose is measured as net exposure (field reading less transit reading) normalized to 92-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, 30 indicator and one control location were monitored and data analyzed in accordance with the requirements in Table 1, Radiological Environmental Monitoring Program – Direct Radiation. Attachment 4, Environmental Direct Radiation Dosimetry Results, provides the annual direct radiation dosimetry analysis.

Waterford 3 reports measured dose as net exposure (field reading less transit reading) normalized to 92 days and relies on comparison of the thirty indicator locations to the one control as a measure of plant impact. Waterford 3's comparison of the inner ring, outer ring, and special interest area, identified no noticeable trend that would indicate that the ambient radiation levels are being affected by plant operations. In addition, the average indicator value of 11.2 millirem (mrem) the 2024 concentration is comparable to historic results. Overall, WF3 concluded that the ambient radiation levels are not being affected by plant operations.

The average exposure rates during 2024 are consistent with those from the preoperational program and the previous five years of operation. In particular, the preoperational survey indicates that exposure rates ranged between 11 and 33 mrem/standard quarter with an average of 20 mrem/standard quarter.

8.2 Air Particulate and Radioiodine Sample Results

Air particulate filters and charcoal canisters are collected at four indicator and one control location as specified in Table 2, Radiological Environmental Monitoring Program – Airborne. During the calendar year 2024, a total of 125 samples were collected and analyzed for gross beta, gamma emitters and iodine. Particulate samplers are used to continuously collect airborne particulates on a filter. The samples are analyzed for gross beta activity following filter changeout which occurs bi-weekly. Gamma isotopic analysis is also performed on the samples collected at each location and is analyzed quarterly. Radioiodine (I-131) analysis is performed bi-weekly on radioiodine sample cartridges.

Indicator gross beta air particulate results for 2024 were comparable to results obtained from 2014-2023 of the operation REMP. In the absence of plant-related gamma emitters, gross beta activity is attributed to naturally occurring radionuclides. Also, the 2024 gross beta annual average was less than the average for preoperational levels and shown in Figure 5, Air Particulate: Analysis for Gross Beta, Average for All Indicator vs. Control Location.

Waterford 3 did not detect any gamma emitters in the quarterly air particulate composites or bi-weekly iodine-131 in the radioiodine cartridges during the reporting period as has been the case in previous years.

The operation of WF3 had no definable impact on this airborne pathway during 2024.

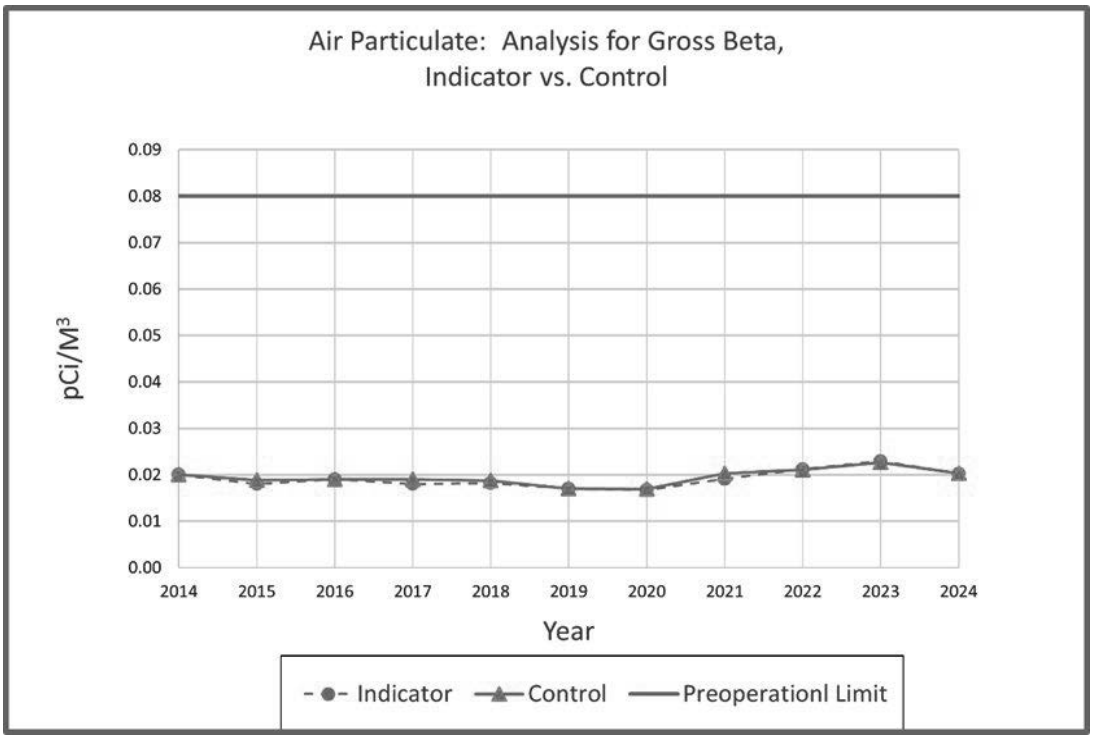

Figure 5, Air Particulate: Analysis for Gross Beta, Average for All Indicator vs. Control Location

8.3 Waterborne Sample Results

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

Surface water samples were collected monthly from one indicator location and analyzed for gamma emitters and tritium. During the calendar year 2024, a total of 13 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.

Gamma radionuclides were below detectable limits for the monthly samples which is consistent with results seen in previous operational years. Tritium was not detected in any of the quarterly samples. The operation of WF3 had no definable impact on this waterborne pathway during 2024.

8.3.2 Drinking/Surface Water

Drinking water samples also serve as surface water samples for WF3. Therefore, monthly and quarterly gamma spectroscopy and tritium analysis of drinking water also satisfy the surface water sampling requirement.

Samples are collected from two indicators and one control location and analyzed for gamma emitters, gross beta, iodine-131 and tritium. During the calendar year 2024, a total of 39 drinking/surface water samples were collected and analyzed in accordance with the requirements in the ODCM and shown in Table 3: Radiological Environmental Sampling Program – Exposure Pathway - Waterborne.

Gamma emitters, iodine-131 and tritium were below detectable limits which is consistent with results seen in previous operational years.

Gross beta was detected in both indicator and control locations. Indicator gross beta results were comparable to results obtained from 2014-2023 of the operational REMP. Also, the 2024 gross beta annual average was less than the average for preoperational levels as shown in Figure 6, Surface Water Gross Beta Sample Results.

The operation of WF3 had no definable impact on this waterborne pathway during 2024.

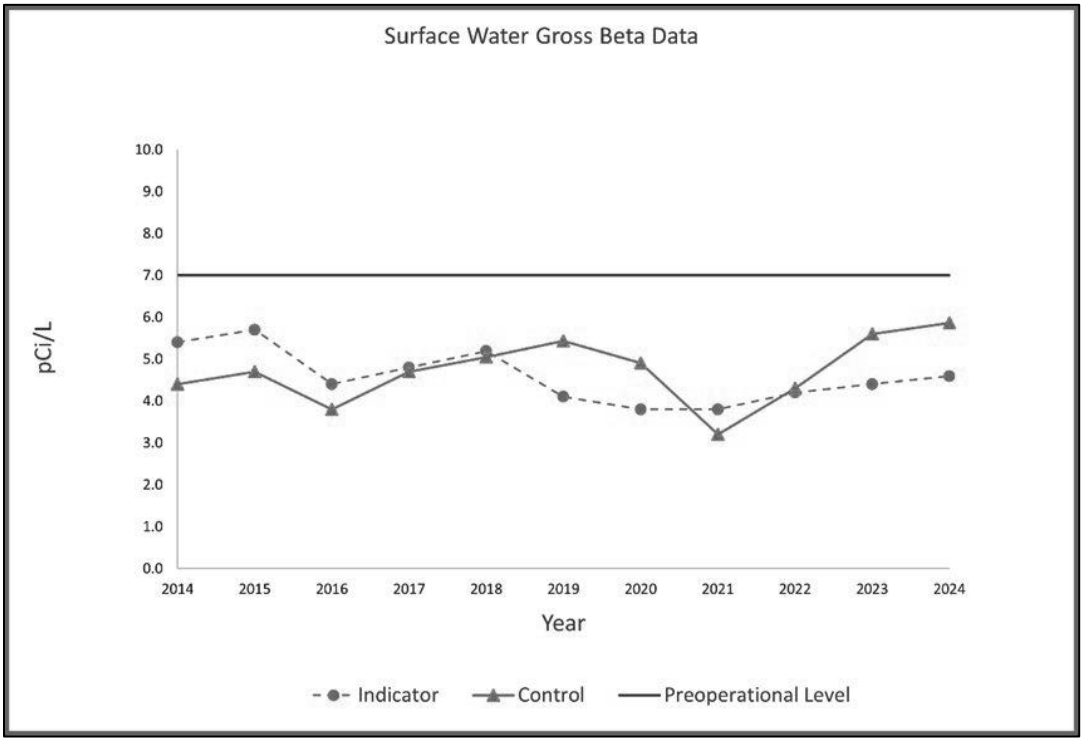

Figure 6, Surface Water Gross Beta Sample Results

8.3.3 Sediment from Shoreline

Sediment samples are collected annually from two indicators and one control location and analyzed for gamma emitters. During the calendar year 2024, a total of three sediment samples were collected and analyzed in accordance with the requirements in the ODCM and shown in Table 3, Radiological Environmental Monitoring Program – Waterborne.

Gamma radionuclides were below detectable limits which is consistent with results seen in previous operational years. Therefore, the operation of WF3 had no definable impact on this waterborne pathway during 2024.

8.4 Ingestion Pathway Sample Results

8.4.1 Milk

Milk sampling from the indicator and control locations is not possible due to the unavailability of milk-producing animals used for human consumption. Waterford 3 Technical Requirements Manual requires a collection of milk samples if available commercially within 8 km (5 miles) of the plant. Waterford 3 personnel collected broad leaf vegetation samples to monitor the ingestion pathway, as specified in WF3 Station Technical Requirements Manual Table 3.12.1. Broad leaf sample results are in Section 8.4.3.

8.4.2 Fish and Invertebrates

Fish samples are collected annually from two indicators and one control location and analyzed for gamma emitters. During the calendar year 2024, a total of 12 fish samples were collected and analyzed in accordance with the requirements of the ODCM and summarized in Table 4, Radiological Environmental Monitoring Program – Ingestion. Only the edible portions are analyzed excluding head, tail, bones, and shell fragments.

Gamma radionuclides were below detectable limits which is consistent with results seen in previous operational years. Therefore, the operation of WF3 had no definable impact on this ingestion pathway during 2024.

8.4.3 Broad Leaf Vegetation

In accordance with the ODCM and as described in Table 4, Radiological Environmental Monitoring Program – Ingestion, 12 broad leaf vegetation samples were collected from growing locations nearest site boundary in areas of highest predicted annual average ground level D/Q. Samples are collected and analyzed for gamma isotopic and iodine-131 from the indicator and control locations annually during growing season. It is common to detect Cs-137 in broad leaf samples at both indicator and control locations throughout the industry. Cs-137 can be attributed to offsite sources such as weapons testing, Chernobyl, and Fukushima events.

Gamma radionuclides which included iodine-131 were below detectable limits which is consistent with results seen in previous operational years. Therefore, the operation of WF3 had no definable impact on this ingestion pathway during 2024.

9.0 LAND USE CENSUS

A biennial 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 [2]. 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 of the nearest milk animal, the nearest residence and the nearest garden of greater than 50 m^2 (500 ft^2) producing broad leaf vegetation. Note, per NUREG-1301/1302, broad leaf vegetation sampling of one to three different kinds of vegetation may be performed at the SITE BOUNDARY in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census.

The Land Use Census was conducted in 2024 in accordance with procedure EN-CY-127 Rev 2, as required by Technical Requirements Manual (TRM) TR 3.12.2 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 Results. In summary, the highest D/Q locations for nearest garden, nearest residence and nearest milk animal did not change following the 2024 census.

Table 8, Land Use Census Results						
Sector	**Direction**	**Nearest Residence (miles)**	**Nearest Garden (miles)**	**Nearest Milk Cow (miles)**	**Nearest Beef Cow (miles)**	**Nearest Goat (miles)**
A	N	1.3	1.3	^	3.6	*3.8
B	NNE	1.0	1.3	^	1.9	^
C	NE	0.9	1.1	^	^	^
D	ENE	0.9	0.9	^	^	^
E	E	2.3	2.3	^	2.3	^
F	ESE	3.2	2.3	^	2.3	^
G	SE	4.0	4.0	^	2.5	^
H	SSE	^	^	^	^	^
J	S	^	^	^	^	^
K	SSW	^	^	^	^	^
L	SW	^	^	^	^	^
M	WSW	^	^	^	^	^
N	W	0.9	1.0	^	^	^
P	WNW	0.9	1.0	^	^	^
Q	NW	0.9	0.9	^	^	^
R	NNW	3.1	3.1	^	5.0	^

Symbol	Comment
^	Nothing was located within a five-mile radius of WF3.
*	Animals were located at this distance from WF3, but the milk is not used for human consumption.

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

Comment No.	Sample Media Affected	Sample Location	Date	Problem	Evaluation / Actions
1	Milk	MKE-3	2024	Sample Unavailable	Milk samples from indicator station MKE-3 were unavailable for all four quarters of 2024 due to there being no indicator milk animals within 8 km of the plant. Broad Leaf vegetation sampling was performed in place of the milk indicator sampling.
2	Milk	MKA-31	2024	Sample Unavailable	Milk samples from control station MKA-31 were not collected in 2024 due to there being no indicator milk animals within 8 km of the plant. Broad Leaf vegetation sampling was performed in place of the milk indicator sampling.
3	Air Sample	APC-1	08/05/24	Pump Not Working	While performing biweekly air sampling, REMP location APC-1 pump was found not working. This issue will cause a lower than usual sample volume. The pump was replaced immediately.
4	Air Sample	APE-26	11/25/24	Pump Not Working	While performing biweekly air sampling, REMP location APE-26 pump was found not working. This issue will cause a lower than usual sample volume. The pump was replaced, and new pump is working properly.

11.0 OTHER SUPPLEMENTAL INFORMATION

11.1 NEI 07-07 Onsite Radiological Groundwater Monitoring Program

Waterford 3 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 the ARERR.

11.2 Corrections to Previous Reports

The 2022 AREOR fourth quarter environmental dosimetry results presented in Table 11 through Table 13 were incorrect. The data was incorrectly adjusted to a standard quarter (91 days). The number of elapsed days in the field used was reported as 83 days. The actual days in the field was 98 days. The standard quarter data was recalculated adjusting the data lower (CR-WF3-2025-01293). The affected data can be seen in Attachment 5, Errata Data 2022 AREOR.

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Attachment 1, Data Table Summary

Medium or Pathway Sampled (Units)	Type / Number of Analyses Performed[1]	Lower Limit of Detection LLD[2]	Indicator Mean (F)[3] [Range]	Location[4] with Highest Annual Mean		Control Mean (F)[3] [Range]	Number of Non-Routine Reported Measurements[5]
				Name Distance and Direction	Mean (F)[3] [Range]		
Air Particulates (pCi/m^3)	GB / 130	0.01	0.021 (104/104) [0.004 - 0.036]	APF-1 (0.35 mi ESE)	0.021 (26/26) [0.011 - 0.036]	0.021 (26/26) [0.011 - 0.034]	0
	GS / 20						
	Cs-134	0.05	< LLD	N/A	N/A	N/A	0
	Cs-137	0.06	< LLD	N/A	N/A	N/A	0
Airborne Iodine (pCi/m^3)	I-131 / 130	0.07	< LLD	N/A	N/A	< LLD	0
Inner Ring TLD (mR/Qtr)	GS / 64	(6)	10.8 (64/64) [8.5/14.3]	B-1 (0.75 mi NNE)	13.3 (4/4) [12.3/14.3]	N/A	0
Outer Ring TLD (mR/Qtr)	GS / 40	(6)	12.0 (40/40) [9.4/14.5]	P-6 (5.58 mi WNW)	13.6 (4/4) [12.9/14.5]	N/A	0
Special Interest TLD (mR/Qtr)	GS / 16	(6)	10.3 (16/16) [9.0/12.0]	G-8 (7.74 SE)	11.1 (4/4) [10.2/12.0]	N/A	0
Control TLD (mR/Qtr)	GS / 4	(6)	N/A	N/A	N/A	9.1 (4/4) [8.6/9.8]	0
Surface Water (pCi/L)	H-3 / 4	2000	< LLD	N/A	N/A	< LLD	0
	GS / 13						
	Mn-54	15	< LLD	N/A	N/A	< LLD	0
	Co-58	15	< LLD	N/A	N/A	< LLD	0
	Fe-59	30	< LLD	N/A	N/A	< LLD	0
	Co-60	15	< LLD	N/A	N/A	< LLD	0
	Zn-65	30	< LLD	N/A	N/A	< LLD	0
	Nb-95	15	< LLD	N/A	N/A	< LLD	0
	Zr-95	15	< LLD	N/A	N/A	< LLD	0
	I-131	15	< LLD	N/A	N/A	< LLD	0
	Cs-134	15	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	< LLD	N/A	N/A	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0

Attachment 1, Data Table Summary

Medium or Pathway Sampled (Units)	Type / Number of Analyses Performed[1]	Lower Limit of Detection LLD[2]	Indicator Mean (F)[3] [Range]	Location[4] with Highest Annual Mean		Control Mean (F)[3] [Range]	Number of Non-Routine Reported Measurements[5]
				Name Distance and Direction	Mean (F)[3] [Range]		
Drinking / Surface Water (pCi/L)	GB / 12	4	4.6 (8/8) [2.6 -7.4]	SF2 (1.5 ESE)	5.1 (4/4) [3.4 – 7.4]	5.9 (3/4) [4.7 – 6.5]	0
	I-131 / 39	1	< LLD	N/A	N/A	< LLD	0
	H-3 / 12	2000	< LLD	N/A	N/A	< LLD	0
	GS / 12						
	Mn-54	15	< LLD	N/A	N/A	< LLD	0
	Co-58	15	< LLD	N/A	N/A	< LLD	0
	Fe-59	30	< LLD	N/A	N/A	< LLD	0
	Co-60	15	< LLD	N/A	N/A	< LLD	0
	Zn-65	30	< LLD	N/A	N/A	< LLD	0
	Nb-95	15	< LLD	N/A	N/A	< LLD	0
	Zr-95	15	< LLD	N/A	N/A	< LLD	0
	Cs-134	15	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	< LLD	N/A	N/A	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0
Sediment (pCi/kg dry)	GS / 3						
	Cs-134	150	< LLD	N/A	N/A	< LLD	0
	Cs-137	180	< LLD	N/A	N/A	< LLD	0
Milk (pCi/L) *Milk samples were unavailable in 2024	I-131 / 0	1	N/A	N/A	N/A	N/A	N/A
	GS / 0						
	Cs-134	15	N/A	N/A	N/A	N/A	N/A
	Cs-137	18	N/A	N/A	N/A	N/A	N/A
	Ba-140	15	N/A	N/A	N/A	N/A	N/A
	La-140	15	N/A	N/A	N/A	N/A	N/A

Attachment 1, Data Table Summary

Medium or Pathway Sampled (Units)	Type / Number of Analyses Performed[1]	Lower Limit of Detection LLD[2]	Indicator Mean (F)[3] [Range]	Location[4] with Highest Annual Mean		Control Mean (F)[3] [Range]	Number of Non-Routine Reported Measurements[5]
				Name Distance and Direction	Mean (F)[3] [Range]		
Fish (pCi/kg wet)	GS / 12						
	Mn-54	130	< LLD	N/A	N/A	< LLD	0
	Co-58	130	< LLD	N/A	N/A	< LLD	0
	Fe-59	260	< LLD	N/A	N/A	< LLD	0
	Co-60	130	< LLD	N/A	N/A	< LLD	0
	Zn-65	260	< LLD	N/A	N/A	< LLD	0
	Cs-134	130	< LLD	N/A	N/A	< LLD	0
	Cs-137	150	< LLD	N/A	N/A	< LLD	0
Broad Leaf Vegetation (pCi/kg wet)	GS / 12						
	I-131	60	< LLD	N/A	N/A	< LLD	0
	Cs-134	60	< LLD	N/A	N/A	< LLD	0
	Cs-137	80	< LLD	N/A	N/A	< LLD	0

(1) - GB = Gross beta; I-131 = Iodine-131; H-3 = Tritium; GS = Gamma scan.

(2) - LLD = Required lower limit of detection based on WF3 TRM.

(3) - Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations is indicated in parenthesis (F).

(4) - Locations are specified (1) by name and (2) direction relative to reactor site.

(5) - Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.

(6) - LLD is not defined in WF3 TRM.

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

Table 10, Bi-Weekly Air Particulate Gross Beta (pCi/m^3)

Start Date	End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-26 (Control)
01/08/24	01/22/2024	2.49E-02 ± 4.41E-03	2.54E-02 ± 4.70E-03	2.37E-02 ± 4.40E-03	2.89E-02 ± 4.74E-03	2.56E-02 ± 4.53E-03
01/22/24	02/05/2024	1.38E-02 ± 3.51E-03	1.11E-02 ± 3.47E-03	1.26E-02 ± 3.45E-03	1.27E-02 ± 3.36E-03	1.09E-02 ± 3.20E-03
02/05/24	02/19/2024	1.61E-02 ± 3.65E-03	1.36E-02 ± 3.63E-03	1.59E-02 ± 3.69E-03	4.38E-03 ± 2.39E-03	1.43E-02 ± 3.56E-03
02/19/24	03/04/2024	2.31E-02 ± 4.22E-03	2.31E-02 ± 4.47E-03	2.19E-02 ± 4.19E-03	2.29E-02 ± 4.26E-03	2.26E-02 ± 4.28E-03
03/04/24	03/18/2024	1.98E-02 ± 3.92E-03	1.53E-02 ± 3.74E-03	1.52E-02 ± 3.57E-03	1.71E-02 ± 3.75E-03	1.59E-02 ± 3.68E-03
03/18/24	04/01/2024	2.25E-02 ± 4.16E-03	2.24E-02 ± 4.40E-03	2.18E-02 ± 4.17E-03	2.11E-02 ± 4.11E-03	1.91E-02 ± 3.99E-03
04/01/24	04/15/2024	1.66E-02 ± 3.72E-03	1.65E-02 ± 3.95E-03	1.73E-02 ± 3.84E-03	1.41E-02 ± 3.51E-03	1.53E-02 ± 3.66E-03
04/15/24	04/29/2024	2.10E-02 ± 4.23E-03	1.91E-02 ± 4.35E-03	1.99E-02 ± 4.22E-03	1.96E-02 ± 4.16E-03	1.92E-02 ± 4.16E-03
04/29/24	05/13/2024	1.39E-02 ± 3.41E-03	1.63E-02 ± 3.86E-03	1.70E-02 ± 3.75E-03	1.85E-02 ± 3.86E-03	1.58E-02 ± 3.65E-03
05/13/24	05/27/2024	1.83E-02 ± 3.86E-03	2.11E-02 ± 4.43E-03	2.01E-02 ± 4.14E-03	1.85E-02 ± 3.90E-03	1.90E-02 ± 3.98E-03
05/27/24	06/10/2024	1.93E-02 ± 3.87E-03	2.05E-02 ± 4.20E-03	2.14E-02 ± 4.10E-03	1.94E-02 ± 4.04E-03	2.07E-02 ± 4.16E-03
06/10/24	06/24/2024	1.83E-02 ± 3.93E-03	2.03E-02 ± 4.23E-03	2.15E-02 ± 4.11E-03	1.98E-02 ± 4.10E-03	1.74E-02 ± 3.92E-03
06/24/24	07/08/2024	1.63E-02 ± 3.60E-03	1.40E-02 ± 3.62E-03	1.49E-02 ± 3.54E-03	1.34E-02 ± 3.39E-03	1.46E-02 ± 3.51E-03
07/08/24	07/22/2024	1.13E-02 ± 3.24E-03	1.20E-02 ± 3.56E-03	1.30E-02 ± 3.48E-03	1.53E-02 ± 3.66E-03	1.20E-02 ± 3.36E-03
07/22/24	08/05/2024	1.49E-02 ± 3.36E-03	1.44E-02 ± 3.51E-03	1.33E-02 ± 3.26E-03	1.50E-02 ± 4.79E-03 (1)	1.94E-02 ± 3.83E-03
08/05/24	08/19/2024	3.25E-02 ± 4.85E-03	3.00E-02 ± 4.97E-03	3.23E-02 ± 4.92E-03	3.35E-02 ± 4.91E-03	3.32E-02 ± 4.98E-03
08/19/24	09/03/2024	1.72E-02 ± 3.57E-03	1.77E-02 ± 3.83E-03	1.78E-02 ± 3.68E-03	1.65E-02 ± 3.48E-03	1.65E-02 ± 3.56E-03
09/03/24	09/16/2024	1.64E-02 ± 3.89E-03	1.75E-02 ± 4.43E-03	1.65E-02 ± 4.14E-03	1.54E-02 ± 3.78E-03	1.64E-02 ± 3.95E-03
09/16/24	09/30/2024	2.84E-02 ± 4.89E-03	2.43E-02 ± 4.68E-03	2.86E-02 ± 4.86E-03	3.10E-02 ± 5.09E-03	2.77E-02 ± 4.80E-03
09/30/24	10/14/2024	2.62E-02 ± 4.14E-03	2.98E-02 ± 4.77E-03	2.81E-02 ± 4.43E-03	2.57E-02 ± 4.11E-03	2.75E-02 ± 4.38E-03
10/14/24	10/28/2024	2.81E-02 ± 4.71E-03	2.96E-02 ± 5.10E-03	2.63E-02 ± 4.65E-03	2.72E-02 ± 4.67E-03	2.66E-02 ± 4.70E-03
10/28/24	11/11/2024	2.01E-02 ± 4.04E-03	1.87E-02 ± 4.17E-03	1.96E-02 ± 4.07E-03	1.86E-02 ± 3.89E-03	1.87E-02 ± 3.96E-03
11/11/24	11/25/2024	2.04E-02 ± 4.05E-03	2.44E-02 ± 4.61E-03	2.27E-02 ± 4.28E-03	2.40E-02 ± 4.32E-03	3.01E-02 ± 7.34E-03 (2)
11/25/24	12/09/2024	3.56E-02 ± 5.18E-03	3.17E-02 ± 5.22E-03	3.28E-02 ± 5.22E-03	3.48E-02 ± 5.12E-03	3.37E-02 ± 5.24E-03
12/09/24	12/22/2024	2.23E-02 ± 4.47E-03	2.01E-02 ± 4.56E-03	1.93E-02 ± 4.43E-03	2.21E-02 ± 4.43E-03	2.29E-02 ± 4.55E-03
12/22/24	01/06/2025	2.07E-02 ± 3.87E-03	2.00E-02 ± 4.16E-03	2.04E-02 ± 3.90E-03	2.42E-02 ± 4.26E-03	2.07E-02 ± 3.95E-03

(1) See Table 9, Sample Deviations Table, Comment #3
(2) See Table 9, Sample Deviations Table, Comment #4

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

Table 11, Bi-Weekly Charcoal Iodine-131 (pCi/m^3)

Start Date	End Date	APF-1 (Indicator)	APQ-1 (Indicator)	APP-1 (Indicator)	APC-1 (Indicator)	APE-26 (Control)
01/08/24	01/22/2024	< 2.20E-02	< 2.42E-02	< 2.26E-02	< 9.30E-03	< 2.24E-02
01/22/24	02/05/2024	< 1.95E-02	< 8.97E-03	< 1.99E-02	< 1.97E-02	< 1.99E-02
02/05/24	02/19/2024	< 2.15E-02	< 9.93E-03	< 2.20E-02	< 2.19E-02	< 2.23E-02
02/19/24	03/04/2024	< 2.23E-02	< 1.03E-02	< 2.29E-02	< 2.27E-02	< 2.30E-02
03/04/24	03/18/2024	< 2.09E-02	< 9.64E-03	< 2.14E-02	< 2.09E-02	< 2.11E-02
03/18/24	04/01/2024	< 1.58E-02	< 1.16E-02	< 1.61E-02	< 1.58E-02	< 1.60E-02
04/01/24	04/15/2024	< 1.63E-02	< 7.56E-03	< 1.67E-02	< 1.65E-02	< 1.66E-02
04/15/24	04/29/2024	< 1.29E-02	< 1.08E-02	< 1.32E-02	< 1.30E-02	< 1.31E-02
04/29/24	05/13/2024	< 2.17E-02	< 1.01E-02	< 2.24E-02	< 2.20E-02	< 2.22E-02
05/13/24	05/27/2024	< 2.48E-02	< 1.19E-02	< 2.63E-02	< 2.52E-02	< 2.54E-02
05/27/24	06/10/2024	< 1.67E-02	< 7.75E-03	< 1.71E-02	< 1.70E-02	< 1.70E-02
06/10/24	06/24/2024	< 1.57E-02	< 1.73E-02	< 1.61E-02	< 7.55E-03	< 1.60E-02
06/24/24	07/08/2024	< 4.28E-02	< 1.99E-02	< 4.40E-02	< 4.36E-02	< 4.38E-02
07/08/24	07/22/2024	< 1.49E-02	< 1.66E-02	< 1.55E-02	< 1.52E-02	< 1.16E-02
07/22/24	08/05/2024	< 9.28E-03	< 1.03E-02	< 9.55E-03	< 1.11E-02 [1]	< 9.48E-03
08/05/24	08/19/2024	< 1.49E-02	< 1.66E-02	< 1.54E-02	< 1.13E-02	< 1.53E-02
08/19/24	09/03/2024	< 1.20E-02	< 1.33E-02	< 1.23E-02	< 5.60E-03	< 1.22E-02
09/03/24	09/16/2024	< 1.34E-02	< 1.20E-02	< 1.47E-02	< 1.32E-02	< 1.36E-02
09/16/24	09/30/2024	< 2.00E-02	< 2.07E-02	< 9.28E-03	< 1.99E-02	< 1.98E-02
09/30/24	10/14/2024	< 1.28E-02	< 1.49E-02	< 1.36E-02	< 6.13E-03	< 1.37E-02
10/14/24	10/28/2024	< 1.40E-02	< 1.18E-02	< 1.44E-02	< 1.44E-02	< 1.48E-02
10/28/24	11/11/2024	< 1.39E-02	< 1.53E-02	< 1.43E-02	< 1.04E-02	< 1.42E-02
11/11/24	11/25/2024	< 1.53E-02	< 1.68E-02	< 1.56E-02	< 1.53E-02	< 2.43E-02 [2]
11/25/24	12/09/2024	< 1.42E-02	< 1.20E-02	< 1.53E-02	< 1.42E-02	< 1.55E-02
12/09/24	12/22/2024	< 1.99E-02	< 1.68E-02	< 2.16E-02	< 1.99E-02	< 2.03E-02
12/22/24	01/06/2025	< 1.17E-02	< 1.31E-02	< 1.17E-02	< 8.88E-03	< 1.22E-02

[1] See Table 9, Sample Deviations Table, Comment #3
[2] See Table 9, Sample Deviations Table, Comment #4

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

Table 12, Quarterly Air Particulate Gamma Isotopic (pCi/m^3)			
Location	**Date**	**Cs-134**	**Cs-137**
APC-1 (Indicator)	01/08/2024 – 04/01/2024	< 2.81E-03	< 2.66E-03
APF-1 (Indicator)		< 2.46E-03	< 2.31E-03
APP-1 (Indicator)		< 2.24E-03	< 2.72E-03
APQ-1 (Indicator)		< 3.29E-03	< 3.14E-03
APE-26 (Control)		< 2.24E-03	< 2.03E-03
APC-1 (Indicator)	04/01/2024 – 06/24/2024	< 1.65E-03	< 1.76E-03
APF-1 (Indicator)		< 2.75E-03	< 2.58E-03
APP-1 (Indicator)		< 3.14E-03	< 2.23E-03
APQ-1 (Indicator)		< 4.49E-03	< 3.65E-03
APE-26 (Control)		< 4.05E-03	< 3.49E-03
APC-1 (Indicator)	06/24/2024 – 09/16/2024	< 3.05E-03	< 2.41E-03
APF-1 (Indicator)		< 2.54E-03	< 1.98E-03
APP-1 (Indicator)		< 3.04E-03	< 2.78E-03
APQ-1 (Indicator)		< 3.13E-03	< 2.50E-03
APE-26 (Control)		< 2.68E-03	< 2.68E-03
APC-1 (Indicator)	09/16/2024 – 12/09/2024	< 3.76E-03	< 4.10E-03
APF-1 (Indicator)		< 3.66E-03	< 3.66E-03
APP-1 (Indicator)		< 2.91E-03	< 2.40E-03
APQ-1 (Indicator)		< 2.23E-03	< 1.98E-03
APE-26 (Control)		< 2.31E-03	< 2.71E-03

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

Table 13, Monthly Surface Water Gamma Isotopic (pCi/L)													
Location	**Date**	**Mn-54**	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**	**Nb-95**	**Zr-95**	**I-131**	**Cs-134**	**Cs-137**	**Ba-140**	**La-140**
SWK-1 (Indicator)	01/15/2024	< 1.28E+00	< 1.32E+00	< 2.73E+00	< 1.45E+00	< 2.62E+00	< 1.34E+00	< 2.31E+00	< 2.79E+00	< 1.43E+00	< 1.31E+00	< 7.19E+00	< 2.47E+00
	02/13/2024	< 2.60E+00	< 2.28E+00	< 5.00E+00	< 2.64E+00	< 5.06E+00	< 2.41E+00	< 4.23E+00	< 2.83E+00	< 2.70E+00	< 2.55E+00	< 9.21E+00	< 3.34E+00
	03/12/2024	< 4.31E+00	< 4.16E+00	< 8.43E+00	< 4.82E+00	< 8.38E+00	< 4.26E+00	< 6.90E+00	< 4.49E+00	< 4.86E+00	< 4.00E+00	< 1.45E+01	< 5.58E+00
	04/08/2024	< 3.48E+00	< 3.99E+00	< 7.87E+00	< 4.56E+00	< 6.47E+00	< 3.25E+00	< 6.36E+00	< 3.84E+00	< 4.31E+00	< 3.83E+00	< 1.22E+01	< 4.34E+00
	05/07/2024	< 1.74E+00	< 1.68E+00	< 3.57E+00	< 1.76E+00	< 3.67E+00	< 1.75E+00	< 3.13E+00	< 2.28E+00	< 1.91E+00	< 1.75E+00	< 6.92E+00	< 2.39E+00
	06/04/2024	< 3.55E+00	< 3.25E+00	< 8.50E+00	< 4.37E+00	< 8.51E+00	< 3.20E+00	< 5.67E+00	< 3.84E+00	< 3.31E+00	< 3.63E+00	< 1.40E+01	< 5.96E+00
	07/02/2024	< 4.51E+00	< 3.89E+00	< 7.60E+00	< 3.81E+00	< 7.81E+00	< 3.92E+00	< 7.15E+00	< 4.25E+00	< 4.63E+00	< 4.19E+00	< 1.48E+01	< 4.45E+00
	07/30/2024	< 2.64E+00	< 2.87E+00	< 6.23E+00	< 3.07E+00	< 5.82E+00	< 2.61E+00	< 5.54E+00	< 3.09E+00	< 3.01E+00	< 3.38E+00	< 9.82E+00	< 3.44E+00
	08/27/2024	< 3.74E+00	< 3.56E+00	< 7.45E+00	< 4.59E+00	< 6.34E+00	< 4.39E+00	< 6.63E+00	< 4.37E+00	< 3.60E+00	< 4.67E+00	< 1.41E+01	< 4.69E+00
	09/25/2024	< 2.94E+00	< 3.51E+00	< 7.99E+00	< 5.00E+00	< 8.42E+00	< 3.27E+00	< 5.69E+00	< 4.06E+00	< 4.01E+00	< 3.28E+00	< 1.46E+01	< 4.95E+00
	10/23/2024	< 1.68E+00	< 1.78E+00	< 3.11E+00	< 2.18E+00	< 3.48E+00	< 1.76E+00	< 3.21E+00	< 2.06E+00	< 2.08E+00	< 1.82E+00	< 6.65E+00	< 2.06E+00
	11/20/2024	< 4.28E+00	< 3.97E+00	< 6.57E+00	< 4.74E+00	< 8.33E+00	< 4.40E+00	< 7.43E+00	< 4.20E+00	< 4.20E+00	< 4.51E+00	< 1.49E+01	< 5.16E+00
	12/18/2024	< 3.55E+00	< 4.14E+00	< 7.08E+00	< 4.58E+00	< 6.78E+00	< 3.38E+00	< 6.95E+00	< 3.73E+00	< 4.42E+00	< 4.24E+00	< 1.46E+01	< 3.95E+00

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

Table 14, Quarterly Surface Water Tritium (pCi/L)		
Location	**Date**	**H-3**
SWK-1 (Indicator)	03/12/2024	< 5.92E+02
	06/04/2024	< 5.67E+02
	08/27/2024	< 5.45E+02
	11/20/2204	< 5.68E+02

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

Table 15, Quarterly Drinking/Surface Water Gamma Isotopic and Gross Beta (pCi/L)

Location	Date	Gross Beta	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
DW/SWE-5 (Indicator)	03/12/2024	2.62E+00 ± 2.43E+00	< 1.52E+00	< 1.49E+00	< 3.04E+00	< 1.72E+00	< 3.43E+00	< 1.54E+00	< 2.70E+00	< 1.71E+00	< 1.63E+00	< 5.72E+00	< 1.87E+00
DW/SWF-2 (Indicator)		3.40E+00 ± 2.75E+00	< 1.46E+00	< 1.32E+00	< 3.02E+00	< 1.70E+00	< 3.03E+00	< 1.40E+00	< 2.44E+00	< 1.57E+00	< 1.56E+00	< 5.26E+00	< 1.96E+00
DW/SWP-7 (Control)		< 2.64E+00	< 1.59E+00	< 1.58E+00	< 3.12E+00	< 1.60E+00	< 3.09E+00	< 1.62E+00	< 2.69E+00	< 1.74E+00	< 1.76E+00	< 6.03E+00	< 1.84E+00
DW/SWE-5 (Indicator)	06/04/2024	3.27E+00 ± 2.60E+00	< 2.95E+00	< 3.28E+00	< 6.47E+00	< 3.25E+00	< 7.35E+00	< 3.43E+00	< 5.61E+00	< 4.36E+00	< 3.55E+00	< 1.45E+01	< 4.66E+00
DW/SWF-2 (Indicator)		4.24E+00 ± 2.79E+00	< 3.87E+00	< 4.42E+00	< 8.14E+00	< 4.31E+00	< 7.46E+00	< 4.52E+00	< 6.80E+00	< 4.19E+00	< 4.06E+00	< 1.40E+01	< 6.20E+00
DW/SWP-7 (Control)		4.66E+00 ± 2.78E+00	< 3.06E+00	< 3.53E+00	< 7.04E+00	< 3.64E+00	< 7.44E+00	< 3.35E+00	< 6.56E+00	< 3.91E+00	< 3.34E+00	< 1.46E+01	< 5.31E+00
DW/SWE-5 (Indicator)	08/27/2024	5.36E+00 ± 2.91E+00	< 1.75E+00	< 2.07E+00	< 3.99E+00	< 2.09E+00	< 4.22E+00	< 1.92E+00	< 3.11E+00	< 2.23E+00	< 2.13E+00	< 7.26E+00	< 2.71E+00
DW/SWF-2 (Indicator)		5.14E+00 ± 2.91E+00	< 1.96E+00	< 1.80E+00	< 3.96E+00	< 2.57E+00	< 4.19E+00	< 1.75E+00	< 3.34E+00	< 2.27E+00	< 2.03E+00	< 7.60E+00	< 2.25E+00
DW/SWP-7 (Control)		6.39E+00 ± 3.05E+00	< 1.76E+00	< 1.70E+00	< 3.89E+00	< 2.01E+00	< 3.53E+00	< 1.96E+00	< 2.91E+00	< 2.17E+00	< 1.95E+00	< 6.62E+00	< 2.57E+00
DW/SWE-5 (Indicator)	11/20/2024	5.24E+00 ± 2.52E+00	< 2.12E+00	< 2.11E+00	< 4.87E+00	< 2.60E+00	< 4.91E+00	< 2.14E+00	< 4.05E+00	< 2.70E+00	< 2.32E+00	< 8.29E+00	< 2.78E+00
DW/SWF-2 (Indicator)		7.44E+00 ± 3.03E+00	< 2.51E+00	< 2.28E+00	< 4.78E+00	< 2.87E+00	< 5.41E+00	< 2.29E+00	< 4.06E+00	< 2.90E+00	< 2.75E+00	< 8.64E+00	< 3.55E+00
DW/SWP-7 (Control)		6.54E+00 ± 2.87E+00	< 2.30E+00	< 2.30E+00	< 4.86E+00	< 2.72E+00	< 4.54E+00	< 2.26E+00	< 4.20E+00	< 2.63E+00	< 2.39E+00	< 8.85E+00	< 2.88E+00

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

Table 16, Monthly Drinking/Surface Water Iodine-131 (pCi/L)		
Location	**Date**	**I-131**
DW/SWE-5 (Indicator)	01/15/2024	< 7.85E-01
DW/SWF-2 (Indicator)		< 7.61E-01
DW/SWP-7 (Control)		< 8.71E-01
DW/SWE-5 (Indicator)	02/13/2024	< 6.05E-01
DW/SWF-2 (Indicator)		< 6.63E-01
DW/SWP-7 (Control)		< 6.92E-01
DW/SWE-5 (Indicator)	03/12/2024	< 8.49E-01
DW/SWF-2 (Indicator)		< 6.91E-01
DW/SWP-7 (Control)		< 7.59E-01
DW/SWE-5 (Indicator)	04/08/2024	< 8.89E-01
DW/SWF-2 (Indicator)		< 8.21E-01
DW/SWP-7 (Control)		< 8.72E-01
DW/SWE-5 (Indicator)	05/07/2024	< 7.70E-01
DW/SWF-2 (Indicator)		< 6.18E-01
DW/SWP-7 (Control)		< 7.45E-01
DW/SWE-5 (Indicator)	06/04/2024	< 7.63E-01
DW/SWF-2 (Indicator)		< 7.48E-01
DW/SWP-7 (Control)		< 8.21E-01
DW/SWE-5 (Indicator)	07/02/2024	< 8.64E-01
DW/SWF-2 (Indicator)		< 8.01E-01
DW/SWP-7 (Control)		< 7.42E-01
DW/SWE-5 (Indicator)	07/30/2024	< 7.07E-01
DW/SWF-2 (Indicator)		< 6.33E-01
DW/SWP-7 (Control)		< 6.67E-01
DW/SWE-5 (Indicator)	08/27/2024	< 8.14E-01
DW/SWF-2 (Indicator)		< 7.23E-01
DW/SWP-7 (Control)		< 8.00E-01
DW/SWE-5 (Indicator)	09/25/2024	< 8.45E-01
DW/SWF-2 (Indicator)		< 7.94E-01
DW/SWP-7 (Control)		< 8.00E-01
DW/SWE-5 (Indicator)	10/23/2024	< 8.14E-01
DW/SWF-2 (Indicator)		< 6.80E-01
DW/SWP-7 (Control)		< 7.84E-01
DW/SWE-5 (Indicator)	11/20/2024	< 8.43E-01
DW/SWF-2 (Indicator)		< 7.62E-01
DW/SWP-7 (Control)		< 9.37E-01
DW/SWE-5 (Indicator)	12/18/2024	< 7.66E-01
DW/SWF-2 (Indicator)		< 5.66E-01
DW/SWP-7 (Control)		< 7.72E-01

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

Table 17, Quarterly Drinking/Surface Water Tritium (pCi/L)		
Location	**Date**	**H-3**
DW/SWE-5 (Indicator)	03/12/2024	< 5.89E+02
DW/SWF-2 (Indicator)		< 5.90E+02
DW/SWP-7 (Control)		< 5.83E+02
DW/SWE-5 (Indicator)	06/04/2024	< 5.55E+02
DW/SWF-2 (Indicator)		< 5.54E+02
DW/SWP-7 (Control)		< 5.65E+02
DW/SWE-5 (Indicator)	08/27/2024	< 5.42E+02
DW/SWF-2 (Indicator)		< 5.51E+02
DW/SWP-7 (Control)		< 5.50E+02
DW/SWE-5 (Indicator)	11/20/2024	< 5.77E+02
DW/SWF-2 (Indicator)		< 5.71E+02
DW/SWP-7 (Control)		< 5.73E+02

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

Table 18, Annual Sediment Gamma Isotopic (pCi/kg dry)			
Location	**Date**	**Cs-134**	**Cs-137**
SHWE-3 (Indicator)	09/09/2024	< 1.25E+02	< 1.05E+02
SHWK-1 (Indicator)		< 1.01E+02	< 8.07E+01
SHWQ-6 (Control)		< 1.11E+02	< 9.23E+01

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

Table 19, Quarterly Milk Gamma Isotopic and Iodine-131 (pCi/L)						
Location	**Date**	**I-131**	**Cs-134**	**Cs-137**	**Ba-140**	**La-140**
MKE-3 (Indicator)	1Q24	(1)	(1)	(1)	(1)	(1)
MKA-31 (Control)		(2)	(2)	(2)	(2)	(2)
MKE-3 (Indicator)	2Q24	(1)	(1)	(1)	(1)	(1)
MKA-31 (Control)		(2)	(2)	(2)	(2)	(2)
MKE-3 (Indicator)	3Q24	(1)	(1)	(1)	(1)	(1)
MKA-31 (Control)		(2)	(2)	(2)	(2)	(2)
MKE-3 (Indicator)	4Q24	(1)	(1)	(1)	(1)	(1)
MKA-31 (Control)		(2)	(2)	(2)	(2)	(2)

(1) See Table 9, Sample Deviations Table, Comment #1
(2) See Table 9, Sample Deviations Table, Comment #2

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

Table 20, Annual Fish Gamma Isotopic (pCi/kg wet)									
Location	**Type**	**Date**	**Mn-54**	**Co-58**	**Fe-59**	**Co-60**	**Zn-65**	**Cs-134**	**Cs-137**
FH-2 (Indicator)	Catfish	10/27/2024	< 7.16E+01	< 4.74E+01	< 1.14E+02	< 6.97E+01	< 1.52E+02	< 7.36E+01	< 6.45E+01
	Buffalo		< 6.04E+01	< 6.84E+01	< 1.21E+02	< 4.53E+01	< 1.41E+02	< 6.43E+01	< 5.78E+01
	Mullet		< 7.08E+01	< 5.34E+01	< 1.28E+02	< 9.68E+01	< 1.74E+02	< 8.48E+01	< 8.29E+01
	Carp		< 8.76E+01	< 9.09E+01	< 1.56E+02	< 1.14E+02	< 1.55E+02	< 9.71E+01	< 1.03E+02
FH-3 (Indicator)	Catfish		< 5.19E+01	< 6.31E+01	< 1.09E+02	< 6.67E+01	< 1.29E+02	< 6.94E+01	< 6.46E+01
	Mullet		< 5.49E+01	< 4.08E+01	< 8.60E+01	< 5.37E+01	< 1.02E+02	< 5.35E+01	< 5.69E+01
	Buffalo		< 4.93E+01	< 4.05E+01	< 7.54E+01	< 6.11E+01	< 9.65E+01	< 5.73E+01	< 6.20E+01
	Carp		< 4.37E+01	< 4.65E+01	< 1.01E+02	< 6.94E+01	< 1.18E+02	< 5.84E+01	< 5.20E+01
FH-1 (Control)	Catfish		< 8.67E+01	< 6.65E+01	< 1.61E+02	< 8.05E+01	< 1.50E+02	< 9.43E+01	< 8.28E+01
	Buffalo		< 5.66E+01	< 5.59E+01	< 1.06E+02	< 7.49E+01	< 1.20E+02	< 6.31E+01	< 6.67E+01
	Mullet		< 5.85E+01	< 4.96E+01	< 1.35E+02	< 5.83E+01	< 6.28E+01	< 8.49E+01	< 7.62E+01
	Carp		< 7.23E+01	< 6.88E+01	< 1.59E+02	< 8.26E+01	< 1.68E+02	< 7.01E+01	< 8.66E+01

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

Table 21, Quarterly Vegetation Gamma Isotopic (pCi/kg wet)				
Location	**Date**	**I-131**	**Cs-134**	**Cs-137**
BLB-1 (Indicator)	03/05/2024	< 2.27E+01	< 2.92E+01	< 2.78E+01
BLQ-1 (Indicator)		< 2.43E+01	< 2.32E+01	< 2.29E+01
BLE-20 (Control)		< 2.71E+01	< 2.57E+01	< 3.01E+01
BLB-1 (Indicator)	06/11/2024	< 2.85E+01	< 3.18E+01	< 3.17E+01
BLQ-1 (Indicator)		< 2.61E+01	< 3.21E+01	< 2.43E+01
BLE-20 (Control)		< 2.26E+01	< 2.43E+01	< 2.28E+01
BLB-1 (Indicator)	09/09/2024	< 5.08E+01	< 5.85E+01	< 5.78E+01
BLQ-1 (Indicator)		< 3.54E+01	< 3.93E+01	< 3.10E+01
BLE-20 (Control)		< 4.03E+01	< 4.16E+01	< 4.26E+01
BLB-1 (Indicator)	12/09/2024	< 3.79E+01	< 4.06E+01	< 3.01E+01
BLQ-1 (Indicator)		< 4.09E+01	< 3.73E+01	< 3.67E+01
BLE-20 (Control)		< 3.08E+01	< 3.81E+01	< 3.59E+01

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.

Teledyne Brown Engineering Environmental Services (TBE-ES) participated in the following proficiency testing studies provided by Eckert & Ziegler (E&Z) Analytics Inc., Environmental Resource Associates (ERA), and Department of Energy (DOE) Mixed Analyte Performance Evaluation Program (MAPEP).

The TBE-ES laboratory analyzed Performance Evaluation (PE) samples of air particulate (AP), milk, soil, vegetation, and water matrices that represent test and matrix combinations available for REMP programs. The Laboratory's intercomparison program results for 20244 are provided in Attachment 3, Cross Check Intercomparison Program.

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

Summary of Results – Inter-laboratory Comparison Program (ICP)

For the TBE-ES, 152 out of 167 analyses performed met the specified acceptance criteria. Fifteen analyses did not meet the specified acceptance criteria and were addressed through the TBE Corrective Action Program. A summary is found below:

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

1. NCR 24-02: ERA March MRAD-40 study with Air Particulate AM-241 evaluated as "Not Acceptable." TBE reported 38.8 pCi/filter and the known value returned at 55.0 pCi/filter (range 39.3-73.3). The root cause investigation determined that the sample was not logged into the system correctly and therefore not prepared with the required tracer. To correct and prevent recurrence, personnel involved are to utilize a template to ensure all analyses are logged as required and the QA Manager will perform sample log review as a back up to ensure accuracy. Acceptable results returned in a later sample study, supporting effectiveness of corrective action.

2. NCR 24-03: ERA March MRAD-40 air particulate study GR-B evaluated as "Not Acceptable." TBE reported 42.1 pCi/filter and the known value returned at 22.2 pCi/filter (range 13.5-33.5). The root cause investigation determined that alpha-to-beta crosstalk was more significant than normal which caused the beta activity to report falsely high data. To correct and prevent recurrence, personnel involved are to adjust the alpha-to-beta crosstalk via correction calculation measures when high alpha activities are observed. Acceptable results returned in a later sample study, supporting effectiveness of corrective action.

3. NCR 24-05: ERA April RAD-137 water study GR-A evaluated as "Not Acceptable." TBE reported 35.2 pCi/L and the known value returned at 52.6 pCi/L (range 39.6-65.6). The root cause investigation determined that the provided samples contained a solids content that was significantly higher than the typical client samples tested by the laboratory. A set aliquot volume for prior ERA samples was used and not adjusted to account for the sudden increase in solid content. To correct and prevent recurrence, new sample types were ordered from ERA that used Am-241 to better reflect client sample testing and acceptable results were achieved. Acceptable results returned in a later sample study, supporting effectiveness of corrective action.

4. NCR 24-06: E&Z Analytics March E14092 air particulate study Co-60 evaluated as "Not Acceptable." TBE reported 168 pCi and the known value returned at 126 pCi. Additionally, March E14093 soil Ce-141 evaluated as "Not Acceptable." TBE reported 0.106 pCi/g and the known value returned at 0.071 pCi/g. The root cause investigation was unable to determine any anomaly thus no proposed corrective action. No recurrence has occurred.

5. CAR 24-02 (CAR 23-31): MAPEP February 24-MaS50 soil study Fe-55 evaluated as "Not Acceptable." TBE reported 297 Bq/Kg and the known value returned at 650 Bq/Kg (range 455-845). The root cause investigation suspects that the current analytical procedure is not sufficient to add the interferences added to the sample by MAPEP. This investigation is still ongoing (See NCR 24-16) as the suggested corrective action did not provide desired results.

6. NCR 24-08: MAPEP February 24-MaS50 soil study Ni-63 evaluated as "Not Acceptable." TBE reported 1070 Bq/Kg and the known value returned at 1530 Bq/Kg (range 1071-1989). The root cause investigation suspected that the sample contained added interferences that are not typically seen in client samples. All QC efforts associated with the sample were acceptable and no anomalies found, even after reanalysis. To correct and prevent recurrence, samples suspected of additional interferences will include the addition of Ni-59 tracer to determine yield results when calculating results. TBE analytical procedure TBE-2013 was updated to include this change.

7. NCR 24-09: MAPEP February 24-MaSU50 urine study Zn-65 evaluated as "Not Acceptable." The root cause investigation determined that the sample was spiked lower than TBE's typical detection limit and client requirements. The report was revised by MAPEP indicating "Not Evaluated," resulting in this nuclide to not be considered a failure.

8. NCR 24-10: MAPEP February 24-MaW50 water study Tc-99 evaluated as "Not Acceptable." TBE reported 9.95 Bq/L and the known value returned 7.47 Bq/L (range 5.23-9.71). The root cause investigation suspects Thorium interference that was not removed during the column separation process of the analytical procedure; however, it cannot be confirmed as all QC efforts associated with the sample were acceptable and with no anomalies found. To potentially correct and prevent recurrence, an additional rinse step was added to the procedure. Acceptable results returned in a later sample study, supporting effectiveness of corrective action.

9. NCR 24-11: MAPEP February 24-RdV50 vegetation study Sr-90 evaluated as "Not Acceptable." TBE reported 0.276 Bq/sample and the known value returned 0.529 Bq/sample (range 0.370-0.688). The root cause investigation determined a laboratory accident resulting in a spilled (loss) of sample. No corrective action was performed as the cause was an unintentional sample spill.

10. NCR 24-14: ERA September MRAD-41 air particulate study U-234/238 evaluated as "Not Acceptable." TBE reported 14.0/14.2 pCi/filter and the known value returned at 31.1/30.9 pCi/filter (range 23.1-36.9). The root cause investigation determined that the laboratory technician placed double the amount of tracer in the sample by error. To correct and prevent recurrence, samples that have been digested/leached with carrier/tracer added will have a label placed over the cap indicating it has already been added. Additionally, the beaker that aliquot is put in should have markings to indicate carrier/tracer has already been added to the sample.

11. NCR 24-15: ERA September MRAD-41 water study Fe-55 evaluated as "Not Acceptable." TBE reported 615 pCi/L and the known value returned at 1230 pCi/L (range 723-1790). The root cause is still under investigation.

12. NCR 24-16: MAPEP August 24-MaS51 soil study Fe-55 evaluated as "Not Acceptable." TBE did not report a value and the known value returned 780 Bq/Kg (range 546-1014). The root cause is still under investigation.

13. NCR 24-17: MAPEP August 24-RdV51 vegetation study Sr-90 evaluated as "Not Acceptable." TBE reported 0.95 Bq/sample and the known value returned 2.39 Bq/sample (range 1.67-3.11). The root cause is still under investigation.

Attachment 3, Cross Check Intercomparison Program

Table 22, Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
March 2024	E14089	Milk	Sr-89	pCi/L	79.6	78.2	1.02	A
			Sr-90	pCi/L	12.6	11.9	1.06	A
	E14090	Milk	Ce-141	pCi/L	75.6	85.0	0.89	A
			Co-58	pCi/L	-0.069	Not Measured		
			Co-60	pCi/L	139	158	0.88	A
			Cr-51	pCi/L	212	230	0.92	A
			Cs-134	pCi/L	167	198	0.84	A
			Cs-137	pCi/L	158	171	0.93	A
			Fe-59	pCi/L	81.1	86.5	0.94	A
			I-131	pCi/L	80.9	90.8	0.89	A
			Mn-54	pCi/L	173	183	0.95	A
			Zn-65	pCi/L	165	176	0.93	A
	E14091	Charcoal	I-131	pCi	90.1	90.3	1.00	A
	E14092	AP	Ce-141	pCi	68.1	67.5	1.01	A
			Co-58	pCi	1.73	Not Measured		
			Co-60	pCi	168	126	1.34	N(1)
			Cr-51	pCi	182	183	0.99	A
			Cs-134	pCi	157	157	1.00	A
			Cs-137	pCi	132	136.0	0.97	A
			Fe-59	pCi	70.3	68.6	1.02	A
			Mn-54	pCi	144	145	0.99	A
			Zn-65	pCi	125	140	0.89	A
	E14093	Soil	Ce-141	pCi/g	0.106	0.071	1.48	N(1)
			Co-58	pCi/g	-0.005	Not Measured		
			Co-60	pCi/g	0.121	0.133	0.91	A
			Cr-51	pCi/g	0.198	0.194	1.02	A
			Cs-134	pCi/g	0.206	0.166	1.24	W
			Cs-137	pCi/g	0.207	0.209	0.99	A
			Fe-59	pCi/g	0.063	0.073	0.87	A
			Mn-54	pCi/g	0.140	0.153	0.91	A
			Zn-65	pCi/g	0.149	0.148	1.01	A
	E14094	AP	Sr-89	pCi	83.9	90.6	0.93	A
			Sr-90	pCi	11.7	13.8	0.85	A

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

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

(*1*) See **NCR 24-06**

Attachment 3, Cross Check Intercomparison Program

Table 22, Analytics Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Ratio of TBE to Analytics Result	Evaluation [b]
September 2024	E14095	Milk	Sr-89	pCi/L	88.0	92.3	0.95	A
			Sr-90	pCi/L	12.4	15.2	0.82	A
	E14096	Milk	Ce-141	pCi/L	124	124	1.00	A
			Co-58	pCi/L	154	150	1.03	A
			Co-60	pCi/L	232	236	0.98	A
			Cr-51	pCi/L	284	274	1.04	A
			Cs-134	pCi/L	180.0	187	0.96	A
			Cs-137	pCi/L	126	127	0.99	A
			Fe-59	pCi/L	127.0	113	1.12	A
			I-131	pCi/L	85.3	89.0	0.96	A
			Mn-54	pCi/L	162	162	1.00	A
			Zn-65	pCi/L	294	275	1.07	A
	E14097	Charcoal	I-131	pCi	98.8	92.6	1.07	A
	E14098	AP	Ce-141	pCi	82.0	76.7	1.07	A
			Co-58	pCi	91.0	92.6	0.98	A
			Co-60	pCi	180	146	1.23	W
			Cr-51	pCi	208	170	1.22	W
			Cs-134	pCi	116	116	1.00	A
			Cs-137	pCi	83.1	78.9	1.05	A
			Fe-59	pCi	75.6	70.2	1.08	A
			Mn-54	pCi	101	100	1.01	A
			Zn-65	pCi	167	170	0.98	A
	E14099	Soil	Ce-141	pCi/g	0.224	0.222	1.01	A
			Co-58	pCi/g	0.249	0.268	0.93	A
			Co-60	pCi/g	0.420	0.423	0.99	A
			Cr-51	pCi/g	0.492	0.492	1.00	A
			Cs-134	pCi/g	0.278	0.336	0.83	A
			Cs-137	pCi/g	0.276	0.295	0.94	A
			Fe-59	pCi/g	0.233	0.204	1.14	A
			Mn-54	pCi/g	0.279	0.290	0.96	A
			Zn-65	pCi/g	0.538	0.494	1.09	A
	E14100	AP	Sr-89	pCi	79.8	82.7	0.96	A
			Sr-90	pCi	12.0	13.6	0.88	A
	E14197	Liquid	Gr-A (Am241)	pCi/L	47.6	50.1	0.95	A
			Gr-B (Cs137)	pCi/L	248	270	0.92	A

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

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

Attachment 3, Cross Check Intercomparison Program

Table 23, DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Acceptance Range	Evaluation (b)
February 2024	24-MaS50	Soil	Fe-55	Bq/kg	297	650	455 - 845	N(3)
			Ni-63	Bq/kg	1070	1530	1071 - 1989	N(4)
			Tc-99	Bq/kg	325	336	235 - 437	A
			Th-228	Bq/kg	34.6	48.8	34.2 - 63.4	W
			Th-230	Bq/kg	49.7	54.0	38.0 - 70.0	A
			Th-232	Bq/kg	36.4	45.1	31.6 - 58.6	A
	24-MaSU50	Urine	Cs-134	Bq/L	1.12	1.36	0.95 - 1.77	A
			Cs-137	Bq/L	2.00	2.23	1.56 - 2.90	A
			Co-57	Bq/L	1.06	1.26	0.88 - 1.64	A
			Co-60	Bq/L	2.26	2.38	1.67 - 3.09	A
			K-40	Bq/L	-1.80	NR	-	
			Mn-54	Bq/L	1.44	1.51	1.06 - 1.96	A
			U-234	Bq/L	0.00101		*(1)*	A
			U-238	Bq/L	0.00228		*(1)*	A
			Zn-65	Bq/L	-0.42	0.84	0.59 - 1.09	NE(5)
	24-MaW50	Water	Ni-63	Bq/L	0.338	0.80	*(2)*	A
			Tc-99	Bq/L	9.95	7.47	5.23 - 9.71	N(6)
	24-RdV50	Vegetation	Cs-134	Bq/sample	2.80	3.67	2.57 - 4.77	W
			Cs-137	Bq/sample	2.21	2.57	1.80 - 3.34	A
			Co-57	Bq/sample	2.23	2.53	1.77 - 3.29	A
			Co-60	Bq/sample	2.42	2.96	2.07 - 3.85	A
			Mn-54	Bq/sample	0.033		*(1)*	A
			Sr-90	Bq/sample	0.276	0.529	0.370 - 0.688	N(7)
			Zn-65	Bq/sample	6.83	8.02	5.61 - 10.43	A

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

(b) DOE/MAPEP evaluation:

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

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

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

(1) False positive test

(2) Sensitivity evaluation

*(3) See **CAR 23-31 - Analyte not on XCHK list***

*(4) See **NCR 24-08***

(5) Not Evaluated

*(6) See **NCR 24-10***

*(7) See **NCR 24-11***

(8) Not Reported

*(9) See **NCR 24-16***

*(10) See **NCR 24-17***

Attachment 3, Cross Check Intercomparison Program

Table 23, DOE's Mixed Analyte Performance Evaluation Program (MAPEP)
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value (a)	Acceptance Range	Evaluation (b)
August 2024	24-MaS51	Soil	Fe-55	Bq/kg	*(8)*	780	546 - 1014	N(9)
			Ni-63	Bq/kg	1140.0 0	1450.00	1015 - 1885	W
			Tc-99	Bq/kg	155.00	171.00	120 - 222	A
			Th-228	Bq/kg	38.00	43.30	30.3 - 56.3	A
			Th-230	Bq/kg	46.10	44.00	30.8 - 57.2	A
			Th-232	Bq/kg	38.90	42.60	29.8 - 55.4	A
	24-MaW51	Water	Ni-63	Bq/L	0.60	-	*(1)*	A
			Tc-99	Bq/L	11.90	11.20	7.8 - 14.6	A
	24-RdV51	Vegetation	Cs-134	Bq/sample	3.12	2.89	2.02 - 3.76	A
			Cs-137	Bq/sample	2.18	1.91	1.34 - 2.48	A
			Co-57	Bq/sample	0.00	-	*(1)*	A
			Co-60	Bq/sample	2.24	2.01	1.41 - 2.61	A
			Mn-54	Bq/sample	3.76	3.53	2.47 - 4.59	A
			Sr-90	Bq/sample	0.95	2.39	1.67 - 3.11	N(10)
			Zn-65	Bq/sample	10.30	9.13	6.39 - 11.87	A

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

(b) DOE/MAPEP evaluation:

A = Acceptable - reported result falls within ratio limits of 0.80-1.20
W = Acceptable with warning - reported result falls within 0.70-0.80 or 1.20-1.30
N = Not Acceptable - reported result falls outside the ratio limits of < 0.70 and > 1.30

(1) False positive test
(2) Sensitivity evaluation
*(3) See **CAR 23-31 - Analyte not on XCHK list***
*(4) See **NCR 24-08***
(5) Not Evaluated
*(6) See **NCR 24-10***
*(7) See **NCR 24-11***
(8) Not Reported
*(9) See **NCR 24-16***
*(10) See **NCR 24-17***

Attachment 3, Cross Check Intercomparison Program

Table 24, ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
March 2024	MRAD-40	Water	Am-241	pCi/L	101	139	95.4 - 178	A
			Fe-55	pCi/L	2185	2480	1460- 3610	A
			Pu-238	pCi/L	62.0	70.4	42.3 - 91.2	A
			Pu-239	pCi/L	61.2	76.5	47.3 - 94.3	A
		Soil	Am-241	pCi/kg	NR	1880	1020 - 2660	
			Pu-238	pCi/kg	667	512	255 - 778	A
			Pu-239	pCi/kg	562	545	297 - 784	A
			Sr-90	pCi/kg	4050	3630	1130 - 5650	A
			U-234	pCi/kg	3040	4360	2040 - 5710	A
			U-238	pCi/kg	3270	4320	2370 - 5800	A
		AP	Am-241	pCi/filter	38.8	55.0	39.3 - 73.3	N(1)
			Fe-55	pCi/filter	387	386	141 - 616	A
			Pu-238	pCi/filter	45.9	41.1	31.0 - 50.5	A
			Pu-239	pCi/filter	54.9	56.1	41.9 - 67.7	A
			U-234	pCi/filter	11.1	11.6	8.60 - 13.6	A
			U-238	pCi/filter	12.8	11.5	8.68 - 13.7	A
			GR-A	pCi/filter	116	95.9	50.1 - 158	A
			GR-B	pCi/filter	42.1	22.2	13.5 - 33.5	N(2)
April 2024	RAD-137	Water	Ba-133	pCi/L	62.8	65.9	50.1 - 81.7	A
			Cs-134	pCi/L	51.0	57.8	42.8 - 72.8	A
			Cs-137	pCi/L	153	186	149 - 223	A
			Co-60	pCi/L	92.1	98.8	79.7 - 118	A
			Zn-65	pCi/L	208	240	188 - 292	A
			GR-A	pCi/L	35.2	52.6	39.6 - 65.6	N(3)
			GR-B	pCi/L	49	46.5	33.9 - 59.1	A
			U-Nat	pCi/L	56.0	59.3	52.8-65.8	A
			H-3	pCi/L	19,000	21,300	18,200 - 24,400	A
			Sr-89	pCi/L	48.9	52.2	37.8 - 66.6	A
			Sr-90	pCi/L	32.6	37.6	32.0 - 43.2	A
			I-131	pCi/L	21.8	25.1	21.7 - 28.5	A

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

(b) ERA evaluation:

A = Acceptable - Reported value falls within the Acceptance Limits

N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 24-02***

*(2) See **NCR 24-03***

*(3) See **NCR 24-05***

*(4) See **NCR 24-15***

*(5) See **NCR 24-14***

Attachment 3, Cross Check Intercomparison Program

Table 24, ERA Environmental Radioactivity Cross Check Program
Teledyne Brown Engineering Environmental Services

Month/Year	Identification Number	Matrix	Nuclide	Units	TBE Reported Value	Known Value [a]	Acceptance Limits	Evaluation [b]
September 2024	MRAD-41	Water	Am-241	pCi/L	108.0	117.0	80.3 - 150	A
			Fe-55	pCi/L	615	1230	723 - 1790	N(4)
			Pu-238	pCi/L	99	103	61.9 - 133	A
			Pu-239	pCi/L	123	133	82.3 - 164	A
		Soil	Am-241	pCi/kg	1320	1110	599 - 1570	A
			Pu-238	pCi/kg	1380	1860	928 - 2830	A
			Pu-239	pCi/kg	796	1030	561 - 1480	A
			Sr-90	pCi/kg	3240	4730	1470 - 7370	A
			U-234	pCi/kg	2540	2860	1340 - 3750	A
			U-238	pCi/kg	2390	2840	1560 - 3810	A
		AP	Am-241	pCi/filter	27.0	29.1	20.8 - 38.8	A
			Fe-55	pCi/filter	644	800	292 - 1280	A
			Pu-238	pCi/filter	22.3	21.5	16.2 - 26.4	A
			Pu-239	pCi/filter	30.6	32.4	24.2 - 39.1	A
			U-234	pCi/filter	14.0	31.1	23.1 - 36.4	N(5)
			U-238	pCi/filter	14.2	30.9	23.3 - 36.9	N(5)
			GR-A	pCi/filter	80.0	72.4	37.8 - 119	A
			GR-B	pCi/filter	57.5	47.9	29.0 - 72.4	A
October 2024	RAD-139	Water	Ba-133	pCi/L	30.3	27.4	15.5 - 39.3	A
			Cs-134	pCi/L	73.3	80.2	63.0 - 97.4	A
			Cs-137	pCi/L	46.6	46.3	23.3 - 69.3	A
			Co-60	pCi/L	44.2	45.3	31.6 - 59.0	A
			Zn-65	pCi/L	104	114.0	75.0 - 153	A
			GR-A	pCi/L	47.6	51.7	38.9 - 64.5	A
			GR-B	pCi/L	44.2	48.1	35.2 - 61.0	A
			U-Nat	pCi/L	28.3	26.90	23.6 - 30.2	A
			H-3	pCi/L	4,690	5,320	3870 - 6770	A
			Sr-89	pCi/L	57.5	44.2	30.6 - 57.8	A
			Sr-90	pCi/L	37.3	35.6	30.2 - 41.0	A
			I-131	pCi/L	28.3	26.3	22.7 - 29.9	A

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

(b) ERA evaluation:

A = Acceptable - Reported value falls within the Acceptance Limits

N = Not Acceptable - Reported value falls outside of the Acceptance Limits

*(1) See **NCR 24-02***

*(2) See **NCR 24-03***

*(3) See **NCR 24-05***

*(4) See **NCR 24-15***

*(5) See **NCR 24-14***

Attachment 4, Environmental Direct Radiation Dosimetry Results

Monitoring Location	Quarterly Baseline B_Q (mrem)	Minimum Differential Dose B_Q+MDD (mrem)	Normalized Quarterly Monitoring Data M_Q (mrem)				Quarterly Facility Dose $F_A = M_Q - B_Q$ (mrem)				Annual Baseline B_A (mrem)	Minimum Differential Dose B_A+10.0 (mrem)	Annual Monitoring Data, MA (mrem)	Annual Facility Dose, $F_A = M_A - B_A$ (mrem, or "ND" if $F_A \leq MDD_A$)
			QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4				
A-2	12.2	17.2	12.5	11.4	11.5	12.5	ND	ND	ND	ND	48.7	58.7	47.9	ND
A-5	12.4	17.4	11.2	10.0	10.2	11.5	ND	ND	ND	ND	49.8	59.8	42.8	ND
B-1	12.9	17.9	13.7	12.8	12.3	14.3	ND	ND	ND	ND	51.6	61.6	53.0	ND
B-4	13.5	18.5	13.4	13.0	12.6	14.1	ND	ND	ND	ND	54.0	64.0	53.1	ND
C-1	9.1	14.1	9.5	8.5	8.5	9.4	ND	ND	ND	ND	36.5	46.5	35.8	ND
D-2	12.3	17.3	12.5	11.8	11.6	12.5	ND	ND	ND	ND	49.4	59.4	48.3	ND
D-5	11.8	16.8	12.3	12.5	11.4	12.8	ND	ND	ND	ND	47.3	57.3	49.0	ND
E-1	11.6	16.6	11.8	11.0	10.5	12.1	ND	ND	ND	ND	46.5	56.5	45.4	ND
E-5	12.7	17.7	12.5	12.4	12.8	13.2	ND	ND	ND	ND	50.9	60.9	50.9	ND
E-15	10.1	15.1	10.5	9.9	9.3	10.3	ND	ND	ND	ND	40.7	50.7	40.0	ND
E-26	9.2	14.2	9.3	8.8	8.6	9.8	ND	ND	ND	ND	36.8	46.8	36.4	ND
F-2	11.2	16.2	10.9	10.7	10.2	12.0	ND	ND	ND	ND	44.6	54.6	43.9	ND
F-4	13.6	18.6	13.3	13.1	12.8	13.9	ND	ND	ND	ND	54.5	64.5	53.1	ND
F-9	10.7	15.7	11.1	10.0	9.8	11.2	ND	ND	ND	ND	43.0	53.0	42.1	ND
G-2	9.9	14.9	11.0	9.9	9.3	10.9	ND	ND	ND	ND	39.7	49.7	41.0	ND
G-4	10.7	15.7	10.7	9.8	9.4	11.0	ND	ND	ND	ND	42.6	52.6	40.9	ND
G-8	10.8	15.8	11.3	11.1	10.2	12.0	ND	ND	ND	ND	43.0	53.0	44.6	ND
H-2	10.5	15.5	10.2	9.8	9.8	11.2	ND	ND	ND	ND	42.2	52.2	41.0	ND
H-8	13.1	18.1	13.0	13.0	12.4	14.0	ND	ND	ND	ND	52.4	62.4	52.4	ND
J-2	10.1	15.1	10.1	9.3	9.3	10.4	ND	ND	ND	ND	40.4	50.4	39.0	ND
J-15	10.4	15.4	9.5	9.0	9.1	10.7	ND	ND	ND	ND	41.6	51.6	38.4	ND
K-1	11.2	16.2	11.2	10.6	10.3	11.7	ND	ND	ND	ND	44.6	54.6	43.8	ND
L-1	12.9	17.9	12.1	12.0	11.1	12.9	ND	ND	ND	ND	51.5	61.5	48.1	ND

Monitoring Location	Quarterly Baseline B_Q (mrem)	Minimum Differential Dose B_Q+MDD (mrem)	Normalized Quarterly Monitoring Data M_Q (mrem)				Quarterly Facility Dose $F_A = M_Q - B_Q$ (mrem)				Annual Baseline B_A (mrem)	Minimum Differential Dose B_A+10.0 (mrem)	Annual Monitoring Data, MA (mrem)	Annual Facility Dose, $F_A = M_A - B_A$ (mrem, or "ND" if $F_A \leq MDD_A$)
			QTR 1	QTR 2	QTR 3	QTR 4	QTR 1	QTR 2	QTR 3	QTR 4				
M-1	10.0	15.0	9.5	9.3	8.8	10.6	ND	ND	ND	ND	40.1	50.1	38.2	ND
N-1	9.6	14.6	9.8	9.6	9.7	10.7	ND	ND	ND	ND	38.5	48.5	39.8	ND
P-1	10.4	15.4	9.9	10.1	10.0	11.0	ND	ND	ND	ND	41.8	51.8	41.0	ND

MDD_Q = Quarterly Minimum Differential Dose = 5.0 mrem
MDD_A = Annual Minimum Differential Dose = 10.0 mrem
ND = Not Detected, where $M_Q \leq (B_Q + MDD_Q)$ or $M_A \leq (B_A + MDD_A)$

Attachment 5, Errata Data 2022 AREOR

The fourth quarter environmental dosimetry report in Table 11 through Table 13 was incorrect. The data was incorrectly adjusted to a standard quarter (91 days). The number of elapsed days in the field used was reported as 83 days. The actual days in the field was 98 days. The standard quarter data was recalculated adjusting the data lower. (CR-WF3-2025-01293)

Table 11: Thermoluminescent Dosimeters - Inner Ring

Analysis: Gamma Dose				Units: mrem/Std.	
Station	1st Qtr 2022	2nd Qtr 2022	3rd Qtr 2022	4th Qtr 2022	Annual Mean 2022
A-2	11.7	11.7	11.1	~~13.9~~ 11.8	~~12.1~~ 11.6
B-1(1)	**13.1**	**12.6**	**12.5**	~~**15.2**~~ 12.8	~~**13.4**~~ 12.8
C-1	9.1	9.0	9.0	~~11.0~~ 9.3	~~**9.5**~~ 9.1
D-2	12.4	11.6	12.3	~~13.7~~ 11.6	~~**12.5**~~ 12.0
E-1	11.2	11.1	11.2	~~13.3~~ 11.2	~~**11.7**~~ 11.2
F-2	11.0	10.4	11.7	~~12.9~~ ~~11.0~~	~~**11.5**~~ 11.0
G-2	10.9	10.4	10.9	~~12.2~~ 10.3	~~**11.1**~~ 10.6
H-2	10.3	10.4	11.1	~~12.4~~ 10.5	~~**11.1**~~ 10.6
J-2	10.0	9.5	10.6	~~12.0~~ 10.1	~~**10.5**~~ 10.1
K-1	10.9	10.9	11.7	~~12.9~~ 11.0	~~**11.6**~~ 11.1
L-1	12.1	12.4	12.6	~~14.9~~ 12.6	~~**13.0**~~ 12.4
M-1	9.9	9.3	10.3	~~11.6~~ 9.8	~~**10.3**~~ 9.8
N-1	10.1	9.7	10.3	~~11.6~~ 9.8	~~**10.4**~~ 10.0
P-1	11.1	9.9	10.9	~~12.1~~ 10.2	~~**11.0**~~ 10.5
Q-1	12.2	11.8	12.3	~~14.1~~ 12.0	~~**12.6**~~ 12.1
R-1	9.3	9.3	9.3	~~10.4~~ 8.8	~~**9.6**~~ 9.1

(1) Inner ring station with highest annual mean.

Table 12: Thermoluminescent Dosimeters - Outer Ring

Analysis: Gamma Dose				Units: mrem/Std.	
Station	1st Qtr 2022	2ndQtr 2022	3rd Qtr 2022	4th Qtr 2022	Annual Mean 2022
A-5	12.2	12.0	11.8	~~14.7~~ 12.5	~~**12.7**~~ 12.1
B-4	13.2	13.0	12.4	~~15.7~~ 13.3	~~**13.6**~~ 13.0
D-5	12.6	12.3	12.2	~~13.4~~ 11.3	~~**12.6**~~ 12.1
E-5	12.6	12.0	13.0	~~15.4~~ 13.1	~~**13.3**~~ 12.7
F-4	13.0	12.9	13.5	~~15.7~~ 13.3	~~**13.8**~~ 13.2
G-4	10.7	10.4	10.7	~~12.8~~ 10.8	~~**11.2**~~ 10.7
H-8	13.2	12.9	(2)	~~15.9~~ 13.4	~~**14.0**~~ 13.2
P-6(1)	**13.6**	**13.4**	**13.9**	~~**16.9**~~ 14.3	~~**14.5**~~ 13.8
Q-5	12.0	11.5	12.5	~~14.1~~ 10.3	~~**12.5**~~ 11.6
R-6	9.8	9.2	10.0	~~10.8~~ 9.2	~~**10.0**~~ 9.5

(1) Outer ring station with highest annual mean.
(2) See Attachment 1, Table 7, Samples Deviations Table, Comment 4

Attachment 5, Errata Data

Monitoring Results Tables

Table 13: Thermoluminescent Dosimeters — Special Interest Areas

Analysis: Gamma Dose				Units: mrem/Std. Qtr.	
Station	1st Qtr 2022	2nd Qtr 2022	3rd Qtr 2022	4th Qtr 2022	Annual Mean 2022
E-15	9.9	9.7	10.0	~~12.2~~ 10.3	~~10.5~~ 10.0
F-9	10.8	10.3	10.9	~~12.4~~ 10.5	~~11.1~~ 10.6
G-8[1]	11.1	11.0	11.2	~~12.9~~ 10.9	~~11.6~~ 11.0
J-15	10.2	9.7	10.2	~~11.7~~ 9.9	~~10.5~~ 10.0

[1] Special interest station with highest annual mean.

Table 14: Thermoluminescent Dosimeters — Control

Analysis: Gamma Dose				Units: mrem/Std. Qtr.	
Station	1st Qtr 2022	2nd Qtr 2022	3rd Qtr 2022	4th Qtr 2022	Annual Mean 2022
E-26	9.1	9.1	9.1	~~10.7~~ 9.1	~~9.5~~ 9.1